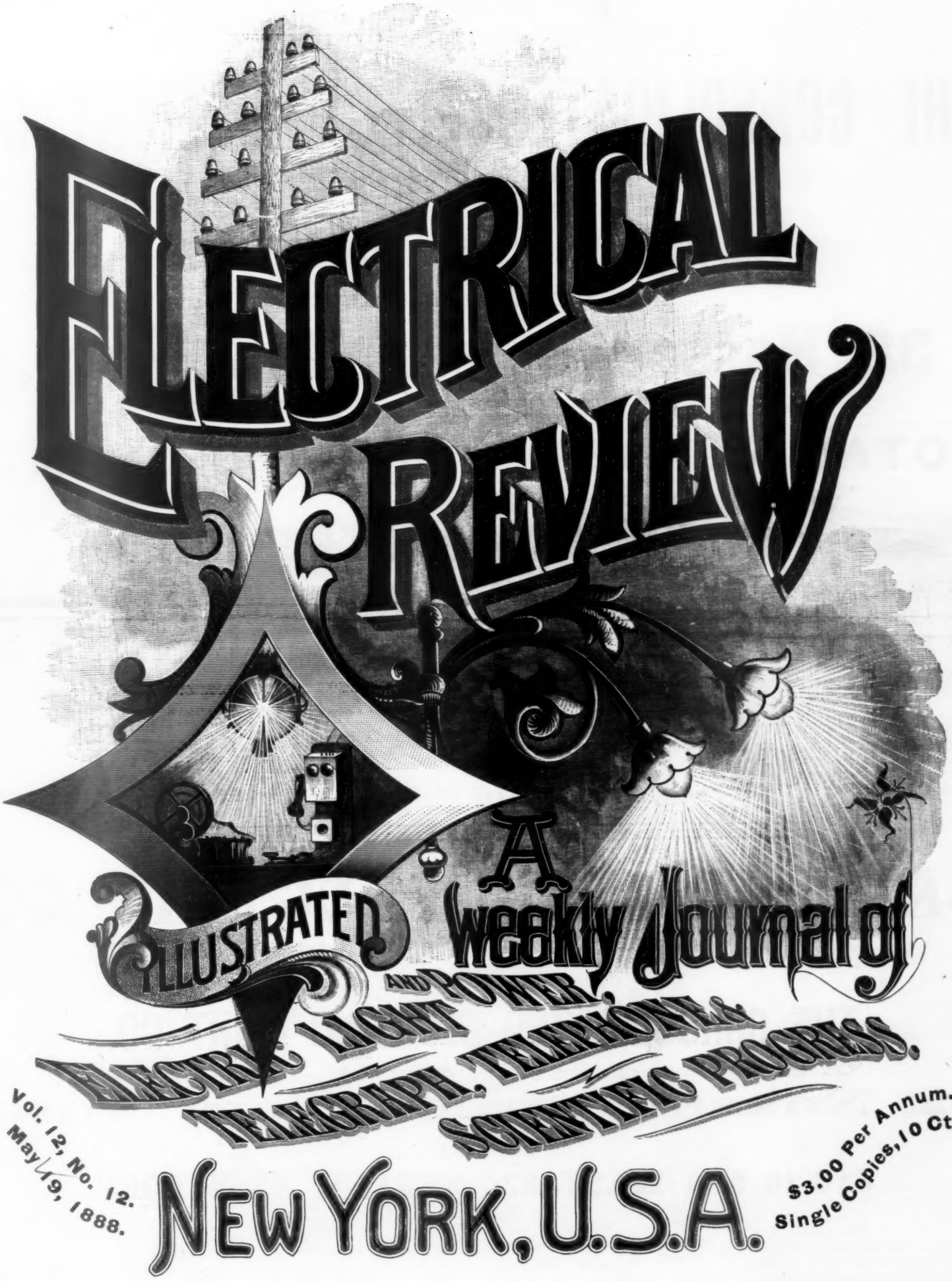

Vol. 12, No. 12.
May 19, 1888.

NEW YORK, U.S.A.

$3.00 Per Annum.
Single Copies, 10 Cts.

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ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

Electric Light, Power, Telephone, Telegraph and Scientific Progress.

VOL. 12, No. 12. WEEKLY. | NEW YORK, SATURDAY, MAY 19, 1888. | $3 per annum. Single Copies, 10 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

The Phonograph at the Electric Club.

A BRILLIANT ASSEMBLY LISTENS TO ADDRESSES BY MR. GILLILAND AND PROF. SPICE.—THE PHONOGRAPH THOROUGHLY AND SATISFACTORILY TESTED.

The great interest manifested in the first public exhibition of the Improved Edison Phonograph was well illustrated by the large attendance at the Electric Club, Saturday night, May 12. The beautifully lighted club house was filled with an interested and

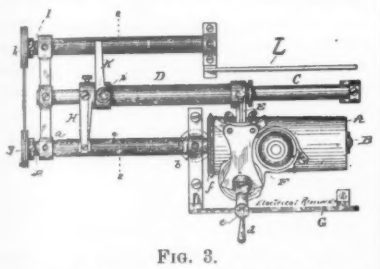

FIG. 3.

fine appearing company, all bent on investigating this new product of the genius of Edison and the painstaking work of his talented co-worker, Mr. E. T. Gilliland. It was an occasion long to be remembered, and that the phonograph proved itself worthy of this great tribute, no one will deny.

Ten years ago, before the enthusiasm wore off which had been kindled by the glowing accounts of the phonograph in the daily press, people flocked to the many public exhibitions and came away feeling that they had really been amused by the comical little thing, much as they are by the song and dance man, who, breathless from his exertion, sits down to get his second wind by a few imitations. "The next, ladies and gentlemen, will be an imitation of a locomotive," and his hearers applaud him, not for the accuracy of his reproduction, but for the skill with which he has seized upon the salient points and emphasized them, to the en-

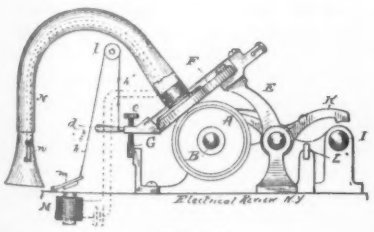

FIG. 4.

forced forgetfulness of the little things that go to make the counterfeit perfect; but nobody would look around startled to see which way the train was coming. And ten years ago the phonograph man bawled well-known couplets into the mouthpiece, and then with his little crank would give "an imitation" of the same. Or, jerking the crank around by himself, he would get a cornetist to blow the tin-foil almost to "smithereens" with the soul-stirring strains of his cherished silver-throated darling, and then make the poor man stand in torture while the phonograph piped forth a blood-curdling and wheezy parody of alleged melody, which, nevertheless, elicited the plaudits of the curious, because of the cleverness of the dwarfed "imitation."

That was the original phonograph as then made, with its tin-foil and hand-crank. It fulfilled no practical purpose, chiefly because of the low efficiency of human lungs when pitted against a brass cylinder armored with tin-foil. It was a foil, assuredly, to all hopes of success in that direction. But the phonograph of to-day is quite another thing,

FIG. 1.—THE EDISON IMPROVED PHONOGRAPH AND THE TYPE-WRITER.

FIG. 2.—THE PHONOGRAPH RECEIVING A MESSAGE.

though the points of difference are apparently slight. It was exhibited at the Electric Club last Saturday night. It is no longer a toy for the curious, and even the gifted Col. Ingersoll, whose motto seems to be "*nil admirari*," found something to wonder at as he listened to the reproduced piano strains of Strauss; and General Sherman, for the first time in his eventful life, was able to speak and afterwards critically listen to the tones of his own voice. Marshall P. Wilder spoke into the instrument and went away saddened by the thought that he is no longer the inimitable humorist, for the phonograph had told the story as well as he had himself, and raised a bigger laugh.

The Electric Club proceedings opened with an address by Mr. Gilliland, who has an admirable voice for public delivery, telling the story of the phonograph, from the first mental flash of conception of Mr. Edison, in 1877, down to the present time, and various points were graphically shown by lantern projections. Prof. Spice followed with an illustrated lecture on the acoustic principles which govern the action of the phonograph. Then Mr. Gilliland exhibited the perfected instrument and brought out its power by inserting a phonogram containing a cornet solo. With a large concentrating funnel the music sounded loudly in all parts of the lecture room, and was vigorously encored. The trills and cadences were exquisitely reproduced, the *forte* and *piano* movements perfectly noted, and the staccato and slurs

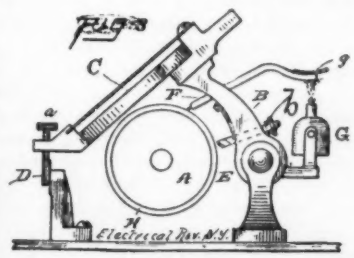

FIG. 5.

very faithful. A slight want of the true *timbre* of the cornet was noticeable; but this was probably caused by extraneous vibrations introduced by the funnel itself, because when a smaller funnel was used for short range afterwards, the *timbre* was almost perfect, since the amount of interference was reduced in proportion to the size of funnel used.

The guests were then invited to help themselves to the many phonographic treats in the various rooms of the Electric Club. The instrument in the lecture room had an assortment of musical selections which charmed everybody—piano solos, string quartets and duets in great variety, and wind instruments were all snugly boxed in a

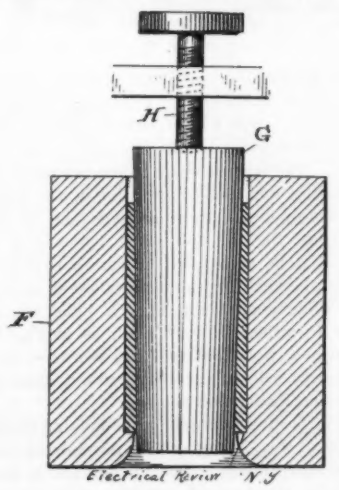

FIG. 6.

small hand case and inserted and played at pleasure. In the library a phonograph with a mellow baritone throated a couple of songs into the ears of the listeners. In the parlors four instruments vigorously gave forth recitations, news paragraphs, the final record of the walking match, and the day's stock quotations. In an upper room Mr. Edison delighted a large crowd with practical demonstrations of the preparation of the phono-

grams and reproduction of the voices of the bystanders, most of whom were celebrated men. General Sherman was bound to understand the pesky thing, and was as pleased as a boy at his first circus. In the next room an expert typewriter was at work in a matter of fact way, writing from the automatic dictation of a phonograph, giving a complete illustration of what will be one of the commonest uses of the instrument. In an another corner of the same room, oblivious to all the disturbing clatter of the typewriter keys and the admiring remarks of the spectators, was a compositor standing, stick in hand, before his case, rapidly setting up matter which was quietly whispered into his ears through the light ear-tubes attached to his head by an easy-fitting spring holder, and controlling the phonograph by a treadle.

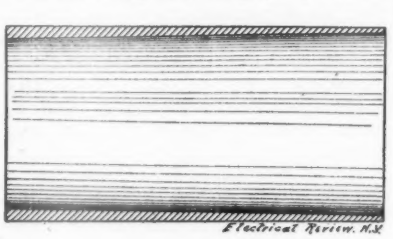

FIG. 7.

Now and then the phonograph would get ahead of him; down came his foot, sending the phonograph back a few words to repeat, and then on again, quietly and steadily. No strain on his eyes, no bending to decipher "hen scratches," no stopping to see where he left off, but comfort and ease in every way. If this one use of the invention can be made general, it will, from a purely humanitarian point of view, be a great blessing, both to the compositor whose life is burdened with the hastily written copy and to the writers, who can sit back at ease and *speak* their rushing thoughts that, when writing, will run away ahead of the pencil, and get lost in spite of everything.

We append a few illustrations of the main features of the phonograph as now constructed.

Fig. 3 is a plan view of the instrument showing the quick return or setting back appliances, and Fig. 4 is an end elevation of the same, as lately patented. But in the finally adopted form, the fast pitched screw shaft, *I*, is now in front, and the main or lead-screw, *c*, is in the center.

Fig. 5 is an end view showing a burnishing

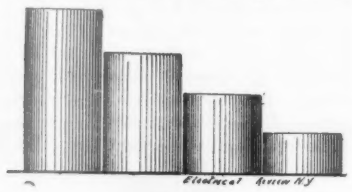

FIG. 8.

attachment, the burnisher, *F*, being gently heated by lamp, *G*, and following the cutter or plane, *b*, puts a most perfect surface on the wax phonogram blank, *E*, ready for recording. The tapered blank is first produced by molding, and then compressing in a polished speculum-metal press, as indicated by the section, Fig. 6, and when removed it is ready to be placed on the carrier cylinder, being tapered for frictional adhesion, as will be understood from Fig. 7. The blanks are furnished in four sizes, as at Fig. 8, carrying from 200 to 1,500 words, which capacity will vary according to the speed of the user's utterance.

Fig. 9 shows the method of making duplicates of the phonograms for purposes of general distribution. The phonogram is first lightly silver-plated outside, then thinly backed with lead, after which the phonogram is melted out, and the metal matrix is flattened out and provided with a heavier backing. With this any number of perfect phonograms can be made, and the fidelity and accuracy is vouched for by the perfection with which even the steel plates in the U. S. Bureau of Printing and Engraving are reproduced by transfer in a manner entirely analogous. In the latter case, the transfer is made from a hardened steel roller to a soft steel plate. But the phonogram is duplicated on a much more tractable surface, wax; the impressionable, but everlasting brick and mortar of the bee-hive.

MR. E. T. GILLILAND'S ADDRESS ON THE PHONOGRAPH.

In these notes which I have made, concerning the phonograph, I wish to call attention especially to the following points:

First.—That Mr. Edison invented, patented and described in print, all the essentials of the present phonograph instrument, ten years ago.

THOMAS A. EDISON.

Second.—That the development of the phonograph, as it now stands before you, has been steadily carried out since that date, but has been delayed by the pressure of other work and by accidental circumstances; and.

Third.—That the phonograph to-day, completed on the original basis set forth ten years ago, is ready to perform various kinds of practical service, which I shall briefly outline to you.

Having been associated with Mr. Edison all through the early history of the invention and during the work of completing the machine to its present form, I am able to speak with confidence as to the facts which I am about to enumerate.

E. T. GILLILAND.

FIGS. 10 AND 11.—THE INVENTOR OF THE PHONOGRAPH AND HIS ABLE CO-WORKER.

The phonograph was suggested to Mr. Edison in the spring of 1877, while making some experiments with a machine for automatically recording and reproducing Morse characters.

This apparatus indented the characters in paper, much the same as the Morse register. The reproduction was accomplished by causing the indentations to pass under a tracing point attached to an electric circuit closing device, which opened and closed the circuit as the point dropped into or was raised out of, the indentations. This machine was intended to receive telegraphic messages from one circuit and to transmit them upon another, without the aid of a skilled operator, and also to facilitate business in a repeating office, inasmuch as one operator could attend to several machines.

As a source of amusement, and to test the rate of speed at which a Morse operator could receive, or read, the reproducing machine was caused to run at a high velocity; and when the speed was increased to such an extent that the ear could not recognize the Morse characters, Mr. Edison noticed that the machine gave off a humming or musical sound, which varied according to characters on the record, apparently talking in a language which could not be understood.

It at once occurred to him that if, instead of identation representing Morse characters he could obtain indentation made by vibrations representing articulate speech, the machine would reproduce the spoken words. It was but the work of an hour to substitute for the telegraph recording apparatus, a diaphragm with an indenting needle; and with this alteration, the machine was used for the experiment of making the first test of the phonograph, which proved the correctness of the idea that a mechanical contrivance could be made to register and repeat articulate speech.

Following closely on the heels of this experiment, a phonograph was constructed on a plan more favorable for attaching a diaphragm, and tin-foil for receiving the indentations was substituted for paper. This phonograph talked very satisfactorily. It was exhibited for the first time outside of Mr. Edison's laboratory, at the office of *The Scientific American*, in New York, was described in that paper March 30th, 1878, and was afterwards presented to the South Kensington Museum, where it can be seen at the present moment.

This phonograph was illustrated and described all over the world, creating great interest and a desire on the part of the public to see and hear it. About one hundred machines for exhibition purposes were made, and licenses to exhibit the phonograph were granted to individuals desiring to engage in the business.

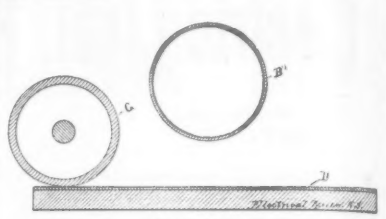

FIG. 9.

These exhibitions were well attended, were profitable, and continued for about one year. During this period, Mr. Edison went on with the work of improving the phonograph and reducing it to a form adapted for practical use.

On account of the rapid growth and extraordinary demand of the electric light business, Mr. Edison's Menlo Park Laboratory was converted into a factory; and, pending the construction of his new laboratory in Orange, he occupied temporary quarters in New York. Owing to this fact, the work of perfecting and preparing the phonograph for manufacture has necessarily been slow.

This work, however, was not laid aside, but has been steadily kept up until the present date.

It has been asserted by some, and believed by a great many, that the work of improving the phonograph was undertaken and accomplished, not by Mr. Edison, but by other persons not connected with him. That the facts in the case may be known, I desire to call attention to a series of improvements upon which patents were taken out by Mr. Edison in 1878, consisting of nearly *one hundred* forms of apparatus, shown by drawings, and a description comprising many pages of printed matter. Every principle embraced in the present improved phonograph, and all the essentials of the so-called graphophone, are shown and described in these patents.

To indicate what the extent of his work in this direction has been, I will show pictures of the drawings of patents taken out ten years ago, and pictures of the perfected apparatus, and point out to you that every principle embraced in the perfected apparatus was anticipated in those patents.

The complete phonograph, as devised and described at that time, was provided with a diaphragm and recording needle for making the record, and another diaphragm and a different form of needle for reproducing. In the exhibition one diaphragm and one needle were used for both recording and reproducing, and tin foil was used for receiving the record; the reason for this being that, for exhibition purposes, it was desirable to have a loud reproduction in order that it might be heard by an entire audience. This loudness was obtained at the expense of articulation. Mr. Edison understood perfectly at this time that a different construction of apparatus was needed to produce perfect articulation. But an instrument built on that different and superior plan would not have been adapted for exhibition purposes.

In paragraph 30, in the patents of 1878, you will find descriptions of the various forms of wax and other material, and the difficulty which Mr. Edison encountered in the use of the same, and the best means which he could devise at that time for overcoming these troubles.

In figures 18, 19 and 22 of these same patents you will also find almost the exact form and proportion of the present recorder and reproducer; and in other of the drawings you will find various forms, with governors, and starting and stopping devices for controlling the same; intermediate gears for increasing the numbers of lines of record;

means for detaching a record from one machine and reproducing it upon another; various appliances for duplicating records; duplex and quadruplex phonographs; multiple speaking and listening tubes; arrangements for making records on flat sheets, on wax cylinders, upon endless tapes and upon tapes wound from reels; a process for making paper coated with wax; a great variety of diaphragms, and more than a dozen forms of mouthpieces.

In the present form of improved apparatus, the only variation from that shown in the drawings published in 1878, is in the proportion, the designs now perfected for convenience of manipulation and the composition of the material upon which the record is made.

Every essential of the improved phonograph, and of all infringing instruments which have so far been brought to our notice, are shown and described in Edison's inventions, made and patented ten years ago.

The various uses to which the phonograph may be put will be fully developed by time and experience; and I am willing to submit it to these tests, without attempting to prophesy. But, after a careful investigation and a long series of experiments, the present form of instrument has been adopted as being the most convenient for those purposes which we believe the phonograph is capable of fulfilling, at once. It has been designed with special reference to being used as a substitute for a stenographer, to the transmission of phonograms through the mails, and to the recording and reproducing of vocal and instrumental music.

In copying records from the machine, a key attachment controls the reproduction; either causing it to wait while the copyist catches up, or to repeat when the words are not understood. For the convenience of typewriters, these keys can also be worked by a foot pedal. By the aid of the same attachment used by the typewriter, the phonographic record can be set up in type direct from the machine, so as to save the time and trouble of writing it out in long hand.

The phonograph will be found exceedingly useful for sending records of spoken words by mail to a distant point, where they can be reproduced upon the phonograph of a friend or business correspondent.

The phonograph will also afford an endless amount of amusement in recording and reproducing music. The voice in solos, duets and even quartets, and instrumental music of all kinds, can be accurately recorded and rendered again with great exactness.

In the rendering of music it is very important that the cylinder should revolve at a uniform rate of speed. A special electric motor has been constructed to regulate this. It differs from the usual form of motor, in that it has a large balance wheel with a nicely adjusted governor. It is connected to the phonograph with a noiseless friction gearing.

A recording blank which will take a continuous record of eight minutes duration (comprising from 1,000 to 1,200 words), has been adopted as the best size for the purpose.

This blank is made of wax, cylindrical in form, one-eighth of an inch in thickness, two inches in diameter and four and one-quarter inches in length. The record is made in a spiral line around the blank, 100 lines to the inch, and is revolved at the rate of 50 revolutions per minute. By the addition of gear wheels 200 lines per inch can be recorded, which would double the capacity; but for the sake of simplicity and favorable conditions for multiplying musical or other records, 100 lines to the inch is preferable.

Half and a quarter size blanks are provided for short records intended for transmission through the mail.

While the record is being made by the voice, a turning-tool attachment near the recording diaphragm shaves off the surface of the wax, in advance of the words as spoken on to it. By means of this, when the recorder is set back at the beginning of the cylinder to be spoken into again, the wax surface bearing the previous record is shaved off at the very instant when you are speaking, so that your new talk finds a fresh surface all ready for it. This operation can be repeated twelve or fifteen times, giving to each wax blank a capacity of fifteen to eighteen thousand words, equal to six or eight columns of printed matter, and costing less than the very cheapest paper which would be required for the same number of words written out in long hand.

A test, made to determine the number of times that the record made upon a wax cylinder can be repeated, shows that it retains its distinctness after thousands of repetitions.

Mr. Edison has also devised a process by which musical or other records can be duplicated cheaply in any desired quantity. The inexpensive and easy multiplication of copies by this process, which is accomplished without having to speak the original matter into the phonograph more than once, will be of great practical service when it is desired to distribute phonogram circulars and announcements, or to deposit copies in a number of different places.

In order to give those who may not be familiar with the science, a clear conception of the sound waves, or vibrations which are utilized in the phonograph, we will now offer some experiments illustrating sound vibrations, which Prof. Robert Spice has kindly consented to conduct.

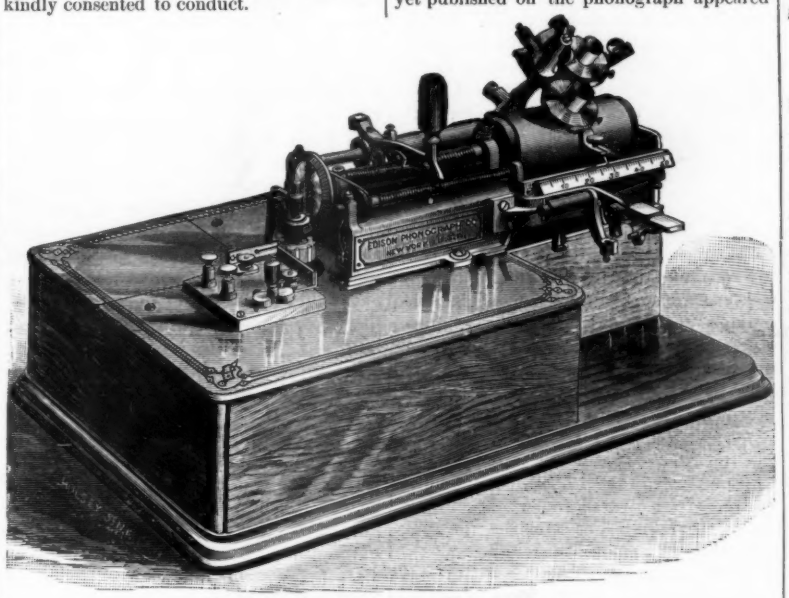

FIG. 12.—THE PERFECTED PHONOGRAPH.

PHONOGRAPHIC ELECTRIC CLUB NOTES.

George Parsons Lathrop asked General Sherman to lean upon a cane while standing up to watch the phonograph into which Marshall P. Wilder was telling a droll story. "No, thank you," said the grizzled old warrior, "I never use a cane, never did carry one, and never expect to."

Mr. Edison took charge of one of the phonographs in an upper room, and was continually surrounded with a delighted crowd. At one time, Thos. A. Edison, Gen. William Tecumseh Sherman, and Col. Robt. G. Ingersoll formed a group around a phonograph and by turns talked into it. No more famous trio of Americans could have assembled.

Dr. Robt. Collyer, of New York; Prof. Chas. R. Cross, of Boston; and Prof. Rood, of Columbia College, made an intellectual group around the phonograph in the library.

The guests were all handsomely entertained.

Toasts were drunk to Mr. Gilliland later in the evening, applauding his interesting and successful first appearance as a lecturer.

It was very kind and considerate of the phonograph company to have two of the instruments at the Club all this week for the accommodation of the Club members and invited guests. A great many ladies visited the Club between 9 and 4 o'clock each day, and became acquainted with the interesting phonograph.

In complimenting Mr. Gilliland upon the delivery of his address and the delightful entertainment of the evening, so largely the result of his efforts, Gen. O. E. Madden said he had remarked that in Mr. Gilliland "here was a man composed of brains, and bones and muscles, who never yet had been put in the balance and found wanting." This statement was loudly applauded..

A little fraternal gathering in one of the private rooms up stairs enjoyed a pleasant hour after the large crowd had gone, and toasts were given and responded to in the most kindly spirit by Messrs. Tomlinson, Gilliland, Davis, Martin, Madden, and others.

This was the first entertainment in many months that Mr. W. B. Sommerville had felt able to attend, and he greatly enjoyed it and met many old time friends.

Mr. John W. Kirk, the gentleman who stood by the side of Prof. S. F. B. Morse when the first telegraph message was sent, was present, and could not fail to be surprised over the indications of the advances electricity had made, as shown by the Electric Club and its comprehensive membership.

Marshall P. Wilder gave the phonograph one of his funny dialogues, and when he heard it repeated back to him, was so appreciative of its oddities that a great laugh came from the crowd of observers, and some one called out, "Killed by his own jokes!"

The most interesting and complete article yet published on the phonograph appeared in Saturday morning's *World*, by George Parsons Lathrop.

Connell, one of *Frank Leslie's* well known artists, made numerous sketches of the scenes presented during the evening.

Howser, of *Puck*, saw many funny uses for the phonograph, and took great interest in all its applications.

Walter P. Phillips, manager of the United Press, said he met more friends at this Club meeting than in any former electrical gathering, and he at once had his name proposed for membership.

Mr. Allen Thorndyke Rice, editor of the *North American Review*, came with General Sherman and Col. Ingersoll. Mr. Rice is greatly interested in all Mr. Edison's work, particularly the phonograph.

The church, the army, the navy, the bar, the press, and genius and science, and many other things came together to witness the advent of the phonograph.

A FEW OF THE ATTENDANTS.

The attendance was very large, and the assembly room during the lecture was crowded to overflowing. The audience was a brilliant one, indeed. Among those present were Rev. Robt. Collyer, Prof. Chas. R. Cross, Dr. Chadbourne, Thomas A. Edison, E. T. Gilliland, Gen. W. T. Sherman, Col. Robt. G. Ingersoll, Allen Thorndike Rice, George Parsons Lathrop, George Alfred Townsend, Mr. Harper, Marshall P. Wilder, Dr. Wilder, Prof. Geo. W. Plympton, Prof. P. H. Vander Weyde, T. C. Martin, Joseph Wetzler, Dr. Avery, George B. Prescott, Jr., W. B. Sommerville, John W. Kirk, Walter P. Phillips, Mr. Foote (of Cincinnati), C. E. Stump, H. C. Adams, R. G. Angell, C. O. Baker, Jr., C. H. Barney, Willard L. Candee, Geo. B. Coggeshall, Leonard E. Curtis, E. A. Colby, W. M. Clark, Thos. P. Conant, A. H. Chadbourne, A. J. Dam, H. C. Davis, L. N. Downs, Chas. Dutton, Isaah H. Davis, S. K. Dingle, R. N. Dyer, S. A. Duncan, Thos. B. Doolittle, Col. Wm. H. Eckert, J. B. Edson, Capt. Henry Erben, Thomas L. Fowler, Willis Fowler, Felix Gottschalk, M. W. Goodyear, M. M. Garver, Henry D. Hall, Herman Hollerith, E. M. Hamilton, Henry Harney, W. A. Hovey, Samuel Ivers, C. J. Kintner, W. D. Ludlow, O. E. Madden, Geo. T. Manson, Dr. Otto A. Moses, Frank C. Mason, T. J. McTighe, J. P. McQuaide, W. E. H. Marsh, John F. Noonan, Chas. W. Price, Geo. M. Phelps, Jr., A. H. Patterson, C. E. Perring, W. D. Packard, Frank A. Pickernell, J. W. Packard, Henry A. Reed, John C. Reilly, John Rooney, Fred. W. Royce (of Washington), Col. C. M Ransom and R. F. Ross (of Boston), H. D. Stanley, W. D. Sargent, A. F. Stanley, Frank G. Stone, John R. Stanton, A. C. Smith, John A. Seeley, M. Roosevelt Schuyler, W. F. Swift, Chas. A. Schieren, John Stanton, A. L. Salt, H. W. Spang, Chas. Selden (of Baltimore), Friend W. Smith, H. B. Thayer, Lieut. F. W. Toppan, U. S. N., John C. Tomlinson, A. O. Tate, W. C. Temple, Albert Taylor, Geo. A. Tobey, W. B. Vansize, Geo. C. Wilde, Geo. Worthington, S. S. Wheeler, F. H. Wilkins, Montgomery Waddell.

Primary Battery Frauds.

The primary electric battery has arrived in Scranton, Pa. The Scranton *Truth* (sadly misinformed on this occasion) gravely informs its readers as follows:

"The electricity is produced in connection with a liquid, on which the inventors have experimented for years, and which is a secret with them. The battery consists of two cells, each containing fifty carbons and twenty-four zincs. There is no waste of zinc while the plant is not in use. One filling will last for three months, and the zincs will last for a year, whereas in ordinary batteries they have to be frequently replaced. These conditions make the new system a very serviceable and money-saving one. Last night twenty cells produced a current that lighted twelve incandescent lamps as thoroughly as any of the lamps on the power companies' circuits. A sewing machine was also run at a high rate of speed by two of the cells.

"This system is designed for the lighting of railway cars and houses.

"It lays the storage batteries completely out, for the reason that with the latter ten hours are required to prepare a car, while the new system will light a car for three months on an hour's preparation."

We suggest to the public, before being gulled, that a few questions concerning primary batteries as an economical means of furnishing light and power be asked of any electrician of standing. But as the "lambs are still bleating on the hillsides, waiting to be shorn," there may be a little wool gathered among the hills of Pennsylvania. The primary battery introducers are lively fellows, and some of them, in their ignorance, believe themselves when making extravagant and impossible claims for the "new fluid" and the "inexhaustible, self-renewing" zinc.

It is claimed, we understand, by the above exploiters, that this battery, said to be the invention (?) of one Geo. C. Ward, of Boston, is endorsed for the purposes announced by George B. Prescott, Jr., of New York. We venture to say that this is wholly false.

Incandescence Filaments.

In testing chemically certain filaments said to be of a material other than carbon, Mr. Desmond Fitz-Gerald, the London *Electrical Engineer* states, boiled them in sulphuric acid, with the view, if carbon were present, of obtaining carbonic oxide and sulphurous acid according to the reaction

$$H_2SO_4 + C = CO + H_2SO_3.$$

No such reaction occurred; the filaments in question remaining unaltered. Before committing himself, however, to the conclusion that no carbon was present, the experimenter took the precaution of repeating the experiment with filaments known to be of carbon. These filaments also remained unaltered after prolonged boiling in the acid. This result justifies the conclusion that the carbon of lamp filaments, unlike, ordinary carbon, is not acted upon by sulphuric acid at its boiling point.

ELECTRICAL REVIEW

Published at 13 Park Row
P. O. BOX 3329.

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REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.
TELEPHONE CALL, 546 JOHN.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.
Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

DEALERS SUPPLIED BY
The Albany News Company, Albany, N. Y.
The American News Company, New York, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, Brooklyn, N. Y.
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The Western News Company, Chicago, Ill.
The Williamsburgh News Co., Brooklyn, E.D., N. Y.

EDITORIAL ANNOUNCEMENT

Address all communications and make all Express Money orders, P. O. orders and checks payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass.

Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, MAY 19, 1888.

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Since his successful debut as a lecturer, he is known as "Prof." Gilliland.

The new work of Mr. Tesla is attracting much attention in electrical circles, as it well deserves.

The New York Board of Electrical Control is the recipient of numerous and varied unfavorable comments.

We understand that an interesting lecture is promised for the Electric Club next month. These monthly gatherings of electrical people are valuable in many ways, and will greatly increase the good work already accomplished in this direction.

The comment on the improved phonograph after its first public trial is altogether favorable. What uses it will be put to the future will develop and no one can now predict. It would not surprise us to see it rapidly "enter society;" that is, become a part of the household furniture for amusement, instruction and convenience in sending messages between neighbors as well as between those who live in different cities. Its use in connection with the typewriter is assured, we think, and its value in the printing office will soon receive a thorough test, no doubt, and from the very favorable decision of the compositor who set type from it at the Electric Club, its success in this direction may soon be announced. It cannot, perhaps, enter the daily printing office, where short takes are so necessary in the rapid dispatch of business in the short hours before going to press, but in magazine work and weekly newspaper work there is a great and promising field.

AIR SHIPS.

Dr. A. de Bausset, of Chicago, the inventor of a model system of aerial ship, has been for some time past endeavoring to procure assistance for the furtherance of his plans through an appropriation from Congress. Much merriment was caused by the introduction of a bill for this purpose, by Mr. Dunham. By way of derision, it was referred to the Committee on Ventilation and Acoustics, of which Landes of Illinois is Chairman. Contrary to the expectations of the funny men of the House, the committee has agreed to a favorable report, recommending an appropriation of $150,000, to assist in the construction of the air-ship, and the Secretary of the Navy is authorized to give the inventor the use of the Navy Yard for the purpose.

The bill as amended requires that $75,000 shall first be put into the enterprise by the doctor, and upon a report to the Secretary, through a commission appointed by that official, that suitable progress is being made, the government will advance one-half the appropriation, the remainder being due and payable when a successful test of the ship has been made.

Readers of the REVIEW will remember a brief description of the invention of Dr. de Bausset, given in these columns, some time ago. The most novel essential in the invention is the creation of a more or less perfect vacuum in a huge metal cylinder, rendering this buoyant. By means of compartments, this cylinder may be made to incline in either direction as its extremes are more or less exhausted. The machinery for thus regulating the altitude of the air-ship, as well as for giving it progressive movement, is all actuated by electricity, and is largely a matter of originality with Dr. de Bausset. While the project from its very novelty, like that of the steamboat, the telegraph, the telephone, in their incipient days—is looked upon as the crazy vision of a dreamer, it is based on well authenticated figures and is acknowledged by competent judges to be founded on a plausible method for successful aerial navigation.

It is claimed by many that this species of transportation is not farther off to-day than was the phonograph or the telephone, when Prof. Jenkins of Louisville, Ky., who was showing the record of vocal vibrations on smoked glass to George D. Prentice, was told by the latter, in a whisper. "rub off the glass, and don't mention it to a living soul, or you'll be in the lunatic asylum in less than a week." No one knew how to make a telephone, then—but now!

The REVIEW congratulates the valiant doctor, and wishes him every success.

CRUSHED AGAIN.

Of late certain daily papers in this city and in Boston have been very full of what was going to happen when the United States Supreme Court came to consider the question of re-opening the telephone case upon the petition of the Drawbaugh people. The readers of these papers have been told in detail just how the court would divide upon the question, and upon this valuable information based their conclusion that the petition would be granted. And it was always to be noticed that in connection with these statements, the further information was conveyed that a little—just a little—Drawbaugh stock was still to be had at the moderate price of six dollars per share.

Well, the Supreme Court has met and passed upon the petition, and has, in the most unfeeling and unceremonious way, sat down on the whole scheme. It simply refuses absolutely to reopen the case, and the Drawbaugh conspirators—for in the light of the late decision they are nothing else—have leave to withdraw from the court with as much grace and dignity as they can muster.

Let it not be supposed that this result will be the cause of any serious pecuniary loss to the Drawbaugh crowd, knowing perfectly well that their alleged claim was what the court has pronounced it to be, an unjust one; thoroughly informed that the facts in the case are exactly as the Court found them, viz: That Drawbaugh never invented the telephone; they have all along known how to shape their speculation. Their real business has been to sell Drawbaugh stock which they knew to be intrinsically worthless to people whom they could delude into the belief that it had a value. For some reason, as yet unexplained, they have had in this nefarious work, the valuable support and assistance of some very prominent newspapers all over the country—papers whose standing ought to be a guaranty to their readers that they would not intentionally lead them astray.

Some day the inside history of the criminal enterprise, which will be known in history as the Drawbaugh conspiracy, will be made public. It will then appear that it was promoted, not at all with any hope of establishing the claims of Daniel Drawbaugh, for he never had any that were worth a moment's consideration, but for the double purpose of imposing on innocent purchasers and of frightening the lawful holders of telephone patents into a compromise. In the latter direction these enterprising persons never had a shadow of success. They have been fought tooth and nail at every point and upon every issue, and they have been uniformly and absolutely beaten in every case. But in the former branch of their industry they have had a greater measure of success. Encouraged, as has been said by the daily press, the lambs have come forward in flocks to render up their fleeces, and then have gone back to shake and shiver in the cold blast while the Drawbaugh magnates reveled in luxury and divided the plunder.

It is altogether probable that, continuing their former tactics, they die hard, these conspirators, for it is not pleasant to give up working so profitable a scheme. The Drawbaugh organs will now inform the public that their great inventor has in the Patent Office an application for a transmitter patent, and that there is a good chance that it will be granted him. Anything to hold up the hopes of the drooping lambs. It may be well to state that there is such an application on file in the Patent Office, but that it has always been excluded from consideration even because it was filed more than two years after the microphonic transmitter was in public use. Therefore, nothing short of an act of Congress could give this desired patent to the inventive gentleman from Eberly's Mills, even though he could prove his claim.

It may be asked why it is, if the American Bell Telephone Company has, as appears from the long and unbroken series of decisions which have been given in its favor, a just claim to a control of the telephone business, that this claim is continually questioned and disputed. Did the reader ever see in a barnyard a hen that had found a particularly large and fat worm? And did he ever notice that, although it was unquestionably hers by right of discovery, she was not allowed to eat it in peace? Was not every other hen trying to get it away from her? There is a good deal of human nature in hens.

THE PHONOGRAPH.

The principles of operation of the phonograph are so closely allied to, if not identical with, those of the telephone, that it has come to be considered as one of the fruits of the electrical seed planted by Faraday when he made the important discoveries that have proven so pregnant with good for the whole world. And it is still more to be considered as among the electrical appliances of the present day, inasmuch as the electric current is now made use of in the instrument for the all-important purpose of maintaining absolutely constant speed at all times, so that the pitch in reproduction will be precisely the same as the pitch used in recording.

Without going into any enthusiastic predictions concerning Mr. Edison's unique conception, but viewing the matter in an altogether dispassionate light, it is evident there is a future of much promise for the phonograph, but that future will almost entirely depend upon the fidelity with which the manufacturers produce the instruments as exact duplicates of one another, and this must be adhered to even though their number should hereafter become legion.

Without indulging in any speculation as to the possible practical uses which may hereafter be discovered for the instrument, it is undoubtedly a fact, as was demonstrated at the Electric Club on Saturday night, that there is an immediate field for it as an aid to correspondence between business houses to the extent of furnishing a substitute for short hand, though it may be doubted whether the direct transmission of the wax phonograms will ever be more than a luxury. The application of the instrument also as a substitute for copy in the composing room, is one of importance.

But for the recording and reproduction of important speeches, recitations, music of all kinds, songs, character sketches, and a multitude of other similar applications, all for the fireside, and the amusement of its possessors, there is here alone a very wide field awaiting the general introduction of the instrument in the market, and we have no doubt that in this respect there could be at once effected large sales, if instruments are offered at a moderate price. In this way the phonograph would take the place of the music box, with the advantage of being able to amuse and entertain in an almost infinite variety of ways, and all these things go to show that the manufacturers will meet with a large market in the near future, and we wish them every success.

The American Institute of Electrical Engineers holds its annual meeting in the house of the American Society of Civil Engineers this week. Officers will be elected, and the following papers are announced: "On a new System of Alternate Current Motors and Transformers, by Mr. Nikola Tesla; "The Possibilities and Limitations of Chemical Generators of Electricity," by Mr. Francis B. Crocker; "Underground Electrical Systems in Europe and America," by Prof. G. W. Plympton, of the Brooklyn Subway Board; "On Compensated Resistance Standards," and "On Prof. Moler's 'Swinging Arm' Galvanometer," by Prof. Edward L. Nichols, of Cornell University; "The Patent Court and Uniformity in Patent Practice," by Mr. George H. Stockbridge; "Protection of the Human Body from Dangerous Currents," by Mr. P. B. Delany.

The Grove Electric Meter, of Philadelphia, has been greatly improved in construction. This is a meter that is attracting considerable attention from electric light people.

Among the several interesting communications in the REVIEW this week is one from an expert Nebraska telephone man, that should be noted by every worker in the telephonic field.

The extensive manufactory of scientific apparatus of J. W. Queen & Co., Philadelphia, is illustrated in a recent issue of *Scientific American*. This is a very complete and interesting establishment, and bears a name that has become widely and favorably known in the scientific, optical and electrical fields.

OUR CHICAGO LETTER.

(Special Correspondence.)

Sometime in September last, Mr. Edison announced gleefully that he had made a grand discovery, and that for six months the matter would remain a mystery for the benefit of prior claimants. What the prior claimants were to guess at and claim Mr. E. was too modest to mention, but that is neither here nor there. The umpire calls time on the inventor, and we all desire to have the mystery explained without further delay.

The gas pipes in Chicago streets, either because these have been so repeatedly disturbed by excavations, changes, etc., or because of age, in the central portion of the city, have become quite weak, and bad leaks are constantly developing. The gas, following the spaces surrounding lateral water or other pipes, works its way into basement, cellars, etc., and escapes wherever there is draught or ventilation. All this species of circulation results in filling up the wire conduits more or less with an explosive mixture which only asks a light to make a sensation. It had that sort of an opportunity the other evening, and blew up a couple of man-hole covers in front of the City Hall, at Washington and Lasalle; and at Randolph and Lasalle another went up. On the following day a second ignition of the gas threw a cover into the air at Washington and Clark streets.

The explanations from bystanders were lucid but peculiar. One said it was sewer gas. Another, that it was similar to thunder and lightning in a storm, and came from an escape of the electricity. But a policeman who happened along, one of that class who is always appealed to and always knows what is expected of him in an emergency, settled the whole mystery at a jerk, remarking, "It's nothin', only the telegraph's busted." The theory that an escaping spark sets the fire is hardly tenable, in face of the fact that every explosion so far has been directly traceable to a candle or lamp in the hands of some employé of a company having wires, or doing work in the conduits.

On the 8th, a terrific thunder shower visited us, and the deadly lightning rod had its half holiday. Two brickmasons were doing work upon a raised cottage at 610 West Fourteenth street, when the lightning struck the rod. Both men were knocked senseless. When they recovered consciousness, Mr. Kamper found his legs paralyzed, while Mr. Schirik (a Pole) found his entire right side in the same condition. Another brick cottage near by was also struck, and the chimney toppled over.

At the last meeting of the Electric Club an amendment to the by-laws was adopted, fixing the annual dues at $16 in place of $12. The initiation remains as before, $10.

Mr. Cutter, despite the rain storm, which had lasted nearly all day, had a good audience that listened to his paper on the alternate side of the current question—Continuous *vs.* Alternate.

The paper was profusely illustrated, and called out Mr. H. W. Leonard, who criticised the criticisms of the reader. It is expected there will be at least two more papers presented the Club on this subject.

Electrical phenomena have been profuse during the past few days. On the 10th instant a tornado passed near Freeport, Ill., which was traced by its wrecks of buildings, stacks, trees and fences for a distance of some fifty miles. The storm passed about four miles east of Valparaiso, Ind., where it hit a side-tracked lot of the Nickle Plate Railroad freight cars, overturning and partially demolishing twenty, some of which were complete wrecks. Seventy-five telegraph poles were prostrated. Rockford, Ill., reports a similar storm, traveling in a southeasterly direction, with like results. Among other peculiar freaks of the elements it is related that a chicken was thrown through a pane of glass into the lap of a woman sitting in the house. Fortunately in no case was any person seriously injured. The general direction of the storm shows that the localities named were all visited by the same tornado.

Mr. Joseph Potowski, a Pole, was struck by lightning on Friday last while working in a lumber yard at the corner of Fleetwood and North avenue, and instantly killed.

Chicago, May 14. C. C. H.

OUR BOSTON LETTER.

(Special Correspondence.)

The regular monthly meeting of the Boston Electric Club, on Monday, seemed to be permeated by an enthusiasm which, starting from the president, proved contagious throughout the gathering. The principal topic of discussion was the proper celebration of the club's anniversary on June 21st. It is at present the intention to make the occasion a worthy and fitting one, bringing together all the noted electrical men of the country and present suitable attraction, electrical and otherwise. A notice has appeared to-day, announcing that the first of the weekly series of familiar talks on brief papers upon electrical and kindred subjects, will be given on Wednesday evening next, by Mr. Hollon C. Spaulding, of the Thomson-Houston Co., upon "The Massachusetts Institute of Technology and its Influence upon Electrical Progress." The first of the "Social Nights" will be on Saturday, when a light lunch will be served.

On last Monday evening, as had been predicted, the Conduit order was taken up in the Board of Alderman, and by a two-thirds vote, the order was passed over the Mayor's veto. The Mayor has since notified the Street Department to issue no permits for opening the streets on this order, taking the ground of the Corporation Counsel, that the whole matter is illegal.

"A certificate of incorporation of the Meigs Elevated Railway Company may be issued at any time within two years, from the date when this act shall take effect," is the text of a bill reported favorably by the Street Railway Committee of the Senate.

Prof. Anthony's lecture on Thursday, before the Society of Arts, describing the theory and operation of the new Tesla alternating motor, drew together a large audience, composed of representatives from nearly all the electric interests of the city, in addition to the regular members of the society.

The many friends of Dr. Mason, of the Simplex Electrical Company, will be pained to learn that the pleasure of his European trip has been rudely broken in upon by the death in London of a brother, who has resided in the British metropolis for some time. Dr. Mason will probably return before the end of the month.

A ten horse-power Baxter Motor has been installed at Lewiston, Me., operating the large presses of the Lewiston *Journal*.

Mr. C. J. H. Woodbury gave an interesting lecture, on Saturday morning, before the students in electrical engineering, of the Massachusetts Institute of Technology, on the fire risks of electric lighting.

The Thomson Electric Welding Company has removed to 70 Kilby st., and now occupy roomy quarters on the second floor of the Mason Building.

The first of the Thompson-Houston Electric motors installed by the New Bedford Gas Company, was started last week with great success. The motor did the work required perfectly, and all who saw it were very much pleased with its operation.

The tailors of this city have awakened to the idea that electricity can be made to do them good service, and as a result large numbers of low horse power motors are being installed for sewing machine work. The Sprague Company has been particularly active in this line during the past two weeks.

The Salem *News*, of Salem, Mass., has purchased a 10 horse-power Thomson-Houston motor, through the Eastern agent, Mr. H. C. Spaulding, to be used in operating its printing press, making eight motors which the company have recently installed for this purpose, besides those for several printing establishments. T. W. S.

Boston, May 14.

Manufacturing Notes.

One of the conveniences of the day is the Kerner calendar slip, in which a perpetual calendar appears directly before the eye of the writer. It is the invention of Walter H. Kerner.

The wire manufacturers are watching the copper market closely. Some of them expect a decided drop in the price of this metal soon. Messrs. Holmes, Booth & Haydens report a very heavy business in their "K. K." wire.

Practical Electricity says: "The American and other large electric lighting companies are using wire covered with cotton saturated with a pecultar compound, manufactured by the Okonite Co., which makes the wires very valuable for use in winding the armatures and field magnets of dynamos."

Mayor Hewitt Disgusted with the Board of Electrical Control.

The strife in the Board of Electrical Control, whose meetings have frequently been of pyrotechnic interest, culminated last week in the secession of the Mayor from that body, and his announcement that he should decline to take any further part in the meetings of the Board. It was the irrepressible conflict between the Mayor and Commissioner Daniel L. Gibbens. The mayor had evidently scented the battle from afar, for he had been rather brusque all the morning, says the New York *Sun*. The Mayor's office has been the meeting place of the Board. As soon as it had met, Mayor Hewitt, sitting opposite Mr. Gibbons at the Board's table, glanced over the printed minutes of the previons meeting, and found that they contained a long letter of Mr. Gibbon's reflecting on him for not ordering the Commissioner of Public Works to remove certain telegraph poles and wires, and that they did not contain his own letter explaining that the Commissioner of Public works had reported to him that there was no money available to pay for such work.

"I protest," exclaimed the Mayor, "against the publication in the minutes of an insulting document addressed to the Mayor and never received by him. Here, while my letter of explanation is suppressed, I find a communication spread on the minutes which is a long, deliberate, and in my opinion, improper attack upon me."

Commissioner Gibbens—But on a requisition to the Board of Apportionment the necessary amount might be transferred from some other appropriation to enable the Commissioner of Public Works to remove the telegraph poles.

Mayor Hewitt—The gentleman who knows so much about the city government ought to know that this can only be done at the request of the department affected.

Mr. Gibbens started to say something, but the Mayor waved him aside and said imperatively, "I do not propose to have any more of these unseemly altercations."

A general discussion followed of the question whether the $25,000 appropriation for the removal of encumbrances was not available. The Mayor held that it was not, and said that he did not sit to issue idle orders that could not be carried out. Commissioner Gibbens retorted that the Mayor sat to oppose the work of the Board. The Mayor hotly replied that he sat there with a knowledge of his rights, and had steadily voted for all steps toward the accomplishment of the purposes of the commission. He declined to have any imputations made upon his motives, and added, "I am tired of it. It must stop."

President Hess explained amiably that, as far as he knew, the minutes were not made up with any idea of being objectionable.

A further discussion of the $25,000 appropriation for removal of encumbrances led the Mayor to say that the Board of Apportionment set it apart for particular purposes, such as the removal of a fence built by a woman to secure privacy, and the destruction of the stands at Fulton street and Broadway. Mr. Gibbens repeatedly asked if the Mayor had given any orders for the removal of the wires instead of asking the Commissioner of Public Works whether he had money to do it with? The Mayor explained sarcastically that he understood what courtesy and comity between public officers required if some persons did not. Mr. Gibbens repeated that the Mayor had not made the order, and the Mayor protested that the conduct of the meetings of the Electrical Board were a scandal, and ridiculous. Mr. Gibbens responded that he would rather be ridiculous than recreant to his duty. The Mayor's objection to the minutes was overruled, three to one, and the minutes were adopted by the same vote.

Mayor Hewitt then said calmly and with dignity:

"I feel bound to say that I consider that a deliberate insult has been levelled at the Mayor. I say it without any feeling, but under the circumstances I shall decline hereafter to attend any meetings of this Board. I was not made a member of it by my own wish, and though I have tried to do my duty as a member, I have not been able to accomplish anything. It is only by putting myself in a very disagreeable position that I can continue to sit with the Board. I know of no rule that requires me to undergo the ordeal. I must decline to sit with men who, in my opinion, have not the instincts of gentlemen."

The Mayor had risen to his feet by the time he reached this startling conclusion, and he turned his back and moved away from the table to his desk, paying no heed to the only spoken response, which was made by Commissioner Theodore Moss with a deep bass voice, and a deeply flushed face, as follows:

"I object to those remarks. I consider that I have the instincts of a gentleman as much as you have, and more."

President Hess looked a little more than half angry, and Commissioner Gibbens glared a little more fiercely than usual at the retreating form of the Mayor, but neither said anything. Commissioner Moss, as though disappointed that nothing was said, added:

"That letter was not suppressed. Every paper has printed it, and the Mayor knows it."

The business of the Commission was then continued, the Mayor busying himself at his own desk some distance away. Rules and regulations adopted by the Board were read, with some amendments proposed by Mr. Gibbens. They contained frequent references to "the poles and wires that the Mayor has been requested to remove." This was read in a loud voice each time. At the end of the business Commissioner Gibbens made a bitter speech on the Mayor's withdrawal. It was voted to meet hereafter at 1218 Broadway.

The Board of Electrical Control.

Mayor Hewitt has refused to sit with the members of the Board of Electrical Control, of which he is an *ex-officio* member, any longer, because the others are, he says, "men who have neither the courtesy nor instincts of gentlemen." With the departure of the Mayor from the Board goes the only restraint upon the schemes of a trio of political tricksters, who know as little about electric matters or business methods as a Digger Indian about the differential calculus.

But what can the Mayor expect in the way of courtesy and gentlemanly refinement from an ex-butcher, an ex-ticket speculator and the very young man who was unloaded on the commission because his previous employer had paid in many large and glittering dollars to the campaign fund of the Democratic party?

We hope that the Mayor will think it over and go back to the Board of Electrical Control. The people need him there.—*Evening Telegram.*

Thesis Subjects in the Massachusetts Institute of Technology.

Following are the thesis subjects of the candidates for the degree of S. B. in the course in Electrical Engineering, of the Massachusetts Institute of Technology:

"Efficiencies of a Weston Motor under various loads."—J. C. T. Baldwin, W. H. Blood.

"Inverse Electromotive force of the Voltaic Arc."—H. W. Blake, R. Robb.

"The relation of the increase of illuminating power with increase of current and energy consumed in incandescent lights."—D. A. Center, L. A. Ferguson.

"Study of Commercial Storage Batteries."—G. E. Claflin, E. F. Dutton.

"Efficiency of various incandescent lamps."—S. H. Cobb, G. B. Pool.

"The influence of metals on Electromagnetic Induction."—E. Collins, Jr.

"An Experimental Study of Harcourt's Pentane Lamp and some other standards of light."—S. C. Hathaway, Jr., E. R. Pearson.

"Specific Inductive Capacity with varying rates of charge."—G. U. G. Holman, F. H. Safford.

"A study of the motions of the electrodes of a microphone transmitter."—A. W. Jones.

"The distribution of potential around the collectors of dynamos."—C. A. Peterson, W. I. Towne.

"Efficiency of alternating current transformers."—C. A. Stone, E. S. Webster.

"The variation in a magnetic transmitter, in the induced current as affected by the strength of the magnet."—A. S. Williams.

Mr. W. J. D. Campbell, secretary of the Brooklyn Civil Service Commission, City Hall, announces a competitive examination for an inspector of telegraph in the Fire Department, to be held Monday May 21st. All applications must be filed by 10 A. M. of that day.

TELEGRAPHIC

.... The telegraph apparatus for the patrol system in the northwestern district, Baltimore, is being placed in position.

.... Rockland, Me., has contracted with the Gamewell Fire Alarm Telegraph Company to put its system into that city at an early day.

.... Macon, Ga., has just established an electric alarm system. Chief Jones of the fire department, assisted by Manager Mullinix of the Bell Telephone Company gave the system a trial and found it in good order.

.... The American District Telegraph Company has secured headquarters in Atlantic City, N. J., and will have a system in operation by June 1st. The company will be known as "The District Burglar Alarm and City Police and Private Messenger Company of Atlantic City."

.... The telegraph line from Point Reyes to San Francisco is soon to be built. It will be about 40 miles long and will cost $5,000. According to the present plans the line will connect the Signal Service office, in the Western Union building, San Francisco, with the light-house at Point Reyes.

.... Melrose, Mass., has adopted the Gamewell Electric Fire Alarm system for the town, and appointed A. W. Lynde, W. B. Ellis, and Samuel Lear, the Board of Engineers, to take charge of its introduction. There will be thirteen alarm boxes in various sections of the town, and two gongs, one upon the town hall and one at the Highlands, the whole to be placed at a cost of $1,700.

.... A division of the Railroad Telegraphers of North America, was organized at the Union station, Worcester, Mass., last week, by S. H. Brown, of West Medford. Its object is mutual benefit and insurance, and only railway telegraph operators are eligible. There are but two other divisions in New England, but the order is very strong in the west. The name adopted was Quinsigamond Division, and the officers are as follows: Alton Beers, chief telegrapher; D. W. Parkhurst, assistant chief telegrapher; A. H. Parker, secretary and treasurer; A. D. Johnson, senior telegrapher; F. A. Paige, junior telegrapher; H. D. Moore, inside sentinel; Thomas McHugh, outside sentinel; R. P. Jones, past chief telegrapher. The division starts off with 23 members, and will have regular stated meetings.

.... Reports have been circulating in Mexico to the effect that English capitalists had under consideration a project to lay a cable between London and Havana, with the intention of extending it to Yucatan, the most eastern State of Mexico. A correspondent of a local paper writes that he has ample authority for stating that any such project would be utterly impossible, for some years to come at any rate, seeing that the "sole concession for laying, working, and maintaining an ocean cable at Havana has already been granted to the Cuba Submarine and the International Ocean Telegraph (International Cable Company, Limited?) Companies of London." The Mexican paper further states that the Government, by its concession with the Central and South American Cable Company of New York, is debarred from permitting any further competing company to land and operate a cable in the State of Yucatan.

.... Mr. A. D. Thurston, Grand Chief of the Order of Railway Telegraphers, made his regular annual visit to the division in Burlington, Iowa, last week, and was well entertained during the day by its members. In the evening 31 members of the order assembled at the Hotel Duncan and, after a secret session at which several members were initiated, dined together. The following gentlemen were present: C. W. Huston, Cedar Rapids; J. J. McElrath, Cedar Rapids; George Irwin, Cedar Rapids; A. P. Bryant, Cedar Rapids; M. E. Stone, Estherville; W. E. Wright, Holland; J. W. Cawthron, Ely; T. F. Miles, Solon; C. W. Home, Oasis; F. S. Muse, Nichols; J. W. Iilingsworth, Wapello; E. Denham, Sperry; W. S. Parker, Mount Pleasant; D. F. Berry, Noble; F. D. Weidenheimer, Galesburg; F. C. Crone, Iowa, Ills.; C. P. Vincent, Ottumwa; J. P. Staats, Ottumwa; J. R. Young, Burlington; E. J. Goodspeed, Burlington; C. R. Howard, Burlington; E. J. Norton, Burlington; J. F. Bosworth, Burlington; E. B. Reppert, Burlington; W. C. Russell, Burlington. This was the largest gathering of railway telegraphers ever seen in Iowa. They were a fine-looking set of capable operators.

A Letter from the Son of Alfred Vail of Telegraph Fame.

TO THE EDITOR OF ELECTRICAL REVIEW:

I desire to express to you my thanks for your kind notice, in the last number of the ELECTRICAL REVIEW, of the article upon my father's part in the invention of the telegraph published in the April number of the *Century* magazine.

It has been a mooted point as to who is deserving of the greatest praise, the one who conceives the idea of accomplishing some great benefit for mankind, or the one who, (acting upon the other's suggestion) by the power of his brain and inventive ability, produces that by means of which the other's mere idea is made a practical, tangible reality. Such seems to me to be the relative position of my father and Morse in the invention of the telegraph.

Morse did produce a machine, but that was soon discarded, and the telegraph of to-day and for all time is what? A system containing not one feature or principle with which Morse had any connection whatever, for the alphabet, the soul (next to the electrical current of the wires), of the telegraph, the key, the register, and per consequence, the sounder, or receiver, were the product of my father's brain.

Morse's claims as inventor, therefore, rest on a very insecure basis.

It may be well for me to add that what I have written was prompted by your comment that, "with the exception of Prof. Morse, he (Alfred Vail) probably did more than any other individual towards perfecting and introducing the telegraph."

I should be very glad to learn what it was that Morse did to perfect the telegraph, as known to-day, for, as I have stated, there is not a feature of the practical system of to-day that he devised in the slightest degree. His sole claim to any credit whatever rests upon having conceived an idea, which he could not put into a practical shape except in the crudest manner. Another accomplished what he could not, and still the former did less than the one who failed, in the opinion of some.

Most truly yours,
STEPHEN VAIL.

Morristown, N. J., May 8.

To Illuminate the Capitol Dome.

The architect of the Capitol, at Washington, in answer to a resolution calling for the information, has reported to the House that the Capitol can be lighted by electricity for about $16,000 per year, and recommends its adoption.

Electric Light for the Glasgow Exhibition.

The International Exhibition at Glasgow, Scotland, is lighted by the Anglo-American Brush Company. The electric light plant is a very large one. Nine large boilers with large engines of various kinds, constitute the steam plant. The main building is lighted by 437 2,000 c. p. arc lamps. There are seventy 2,000 c. p. arc lamps in the grounds and forty in the art galleries. A large incandescence plant is used in lighting the dining-rooms.

—— The Board of Public Works and Affairs, of Nashville, Tenn., has instructed the Electric Light Company to light the capitol grounds during the spring and summer months.

More about the Telephone in Wheatstone Bridge Measurements.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your last issue you publish a letter from Mr. Chas. H. Richardson, in which he states that the telephone for Wheatstone Bridge measurements is limited and uncertain. If used in the way he describes with a current interrupter in the battery circuit *before it enters the bridge*, I can readily see that he is right; but if the battery is constant, as in the use of the galvanometer, and the *bridge circuit only* broken, the electrical conditions, it seems to me, must be just the same with the telephone as with the galvanometer; if the bridge is balanced there will be no electrical disturbance when the circuit in same is broken, whether the former or the latter is used, but as long as the resistance of same is unequal, in the case of the telephone you will *hear* a click upon pressing the key included in the bridge, which will be either strong or weak as you approach or recede from a balance; in the case of the galvanometer, you will *see* the needle move with more or less force under the same conditions. If the telephone used in this way is subject to inductive interference (and I am confident it is not), then the galvanometer must certainly be troubled in the same way. I have used this method of measurement for two years past, and have found it to correspond with two galvanometers with which I have frequently compared it. I have also measured coils in new instruments to see if the telephone measurements agreed with the resistance stamped upon them, and have in all cases found that they did.

For practical use, for telephone inspectors, superintendents of construction of telephone or telegraph lines, the telephone is the more convenient, as it is sensitive to less battery than the common form of galvanometer; can be used in any position, even on a pole at a cable terminal; is not sensitive to any outside disturbing influences, such as the presence of masses of iron or other magnets, can be combined in a case with a test instrument so that an inspector making a test out on a line can talk directly to central office. It is also portable for a travelling inspector.

The Nebraska Telephone Company have fitted up in this way, silver battery, microphone and small Gilliland telephone, for the use of the State inspector, so that he can go into an exchange, place his instrument on some convenient desk or table, call up each subscriber, talk with him and measure his line at the same time by merely turning a three-point switch, without any preliminary arrangements other than the running of two flexible cords to the switchboards. The same case also includes his report blanks, on which he sends in the condition of each line and statement of each subscriber, to the general manager. A line can also be measured in this way and a balance obtained, when such could not be done by the galvanometer on account of the inductive interference from other lines, which would keep the needle constantly moving. In the use of the telephone the same disturbances are noticed, but they have their own distinct sound, different from the click heard for measuring purposes, and easily distinguished.

For measuring insulation of cables, etc., I have only been able to do so approximately as the rheostat I have access to has a capacity of only 1,111,000 ohms; but if we have a line or cable whose insulation comes within this limit, I have no trouble in getting its measurement.

Those who have tested this method have been well satisfied with it, and for general practical use prefer it to the galvanometer. I have one set made for shop use in which, in place of the key in bridge circuit, I have inserted a mechanical make and break, worked by an electro-magnet influenced by a battery entirely distinct from the test battery; this saves the trouble of pressing the key at every step made on the rheostat, the plugs of rheostat being made so that they slide over the projections connected with the resistance coils; in this way a measurement is easily and quickly made.

Yours truly,
A. F. BLUNDELL.
(Of the Nebraska Telephone Co.)
Omaha, May 7, 1888.

Electrical Resistance of Nickel.

In a note recently laid before the Turin Academy of Sciences, Dr. A. Batelli states the conclusions arrived at from his experimental investigations. These are: 1. That the resistance of nickel slowly increases with the temperature from 0 deg. to 225 deg. cent., and more rapidly from the latter temperature up to 365. From this point the resistance augments more slowly as the temperature is increased. 2. That the temperatures at which the variation in the rate of the increase of resistance occurs are the same as those at which irregularities in the thermo-electric properties of the metal are observed.

War Among the Cable Companies.

LONDON, May 7.—The cable war shows no sign of coming to an end. The Mackay and Bennett cable, otherwise known as the Commercial Cable Company, continues to stand out upon an independent footing, and is now preparing for a fresh attack upon the pool companies.

The merchants of Mincing lane and Mark lane have contributed for years many thousands of cablegrams to the pool companies, and it is the intention of the new company to break up the monopoly and detach a large slice of this golden business. With a view to assist the attack, the directors have just opened an office in Mark lane.

The Mackey-Bennett Company has made many friends, especially among journalists, for this company brought down the almost prohibitive tariff for press messages between the New World and the Old.

Personal.

Mr. Geo. M. Chapman, Superintendent of the Standard Electric Time Company, delivered an address before the Y. M. C. A., of Waterbury, on "Electricity," in which he highly entertained a good-sized audience.

H. A. Cleverly came over from Philadelphia last week, for a change, and to see a wide-awake village.

Mr. N. W. Ellis, a prominent citizen of Manchester, N. H., was in New York last week investigating storage battery matters W. F. Stocker, of Kansas, was in the city on the same business.

J. D. Richardson, Jr., Superintendent of the Newport (R. I.) Incandescent Light Company, was a New York visitor last week. He is contemplating the use of storage batteries in connection with his electrical plant, and is arranging with the Electrical Accumulator Company for the same.

Mr. A. Van Winkle, of the well-known firm of Hanson, Van Winkle & Co., is visiting in Europe, and enjoying a well earned rest. In about another month he expects to return to New York,

Mr. Nikola Tesla, the promising young inventor, is a subject of the Austrian Government, a native of Smiljan, Lika, on the Austrian border. He has been in America about three years, and is one of the most modest and unassuming of men. Several gentlemen of standing are interested in his work, an outline of which appeared exclusively in the ELECTRICAL REVIEW last week.

Mr. W. F. Swift, secretary of the Brush Electric Company, has returned from a two months' trip through the south. His headquarters are now in New York at 36 Union Square.

Boston's Mayor's Veto Overruled.

The Boston Aldermen, on Monday night of last week, overruled the Mayor's veto of the conduit order, and the order passed giving permission to Henry E. Cobb, R. M. Pulsifer, and others, to build conduits in the streets for carrying electric wires underground. This gives an exclusive franchise for twenty years.

* * Apparently the objection remains against the electric motor that it costs a little more than horse-power. Experience only can determine whether it is eventually more costly. If so, it is very unlikely that the additional cost will be large enough to make electric cars unprofitable. They have been introduced into twenty-one cities in this country, and we have as yet to hear that in a single instance the expense of the electric motors have prevented the traffic of any of the lines using them from being lucrative. Other things being equal, the public will always ride in electric cars in preference to horse cars.—*N. Y. Herald.*

The Use of a Dynamo in Telephone Exchanges.

The invention of Mr. R. N. Dyer, of New York, in which he substitutes the dynamo-electric machine for the batteries in telephone circuits, is illustrated in this issue. The inventor states as his object, to provide a source of electrical energy for telephones and telephone lines, for transmitting and receiving articulate speech thereby, which source will be of a constant character, and will not be subject to the numerous objections of the galvanic batteries now in use. In carrying out this invention he employs dynamo currents, or such as are generated by dynamo or magneto electric machines. In adapting machines of this character to the operation of telephones and telephone lines obstacles are met with arising from the nature of the current to be dealt with, it being far more powerful than required for telephone use, and from the imperfect commutation of such machines causing a vibration in the receivers, producing a noise which interferes to some extent with the reproduction of articulate speech; but such a source, when adapted for this use, has the advantages over galvanic batteries of being practically constant in its energy, and since, in using dynamo or magneto electric machines, a common source of supply must be employed for a large number of telephones, the subscribers are relieved of the annoyances experienced with separate galvanic batteries, of having sources of energy which require frequent attention, often get out of order, and seldom have the standard power.

An efficient method of applying dynamo currents to the operation of telephones and telephone lines the inventor finds as follows: A circuit independent of the telephone circuit is constructed, and this circuit is provided with current from one or more dynamo or magneto electric machines located at any suitable point. The local transmitter circuit of each telephone set is connected in multiple arc with this dynamo supply circuit, each connection being a circuit independent of all other connections, and by means of a suitable arrangement of resistances the dynamo current is reduced and modified, and the proper energy is supplied to each telephone. The telephone transmitters being located each in a local circuit, including also the primary of an induction coil, and the receivers being each in connection with the line and the secondary of an induction coil, the connections with the independent dynamo circuit will be made so as to supply the energy to the local transmitter circuits, each transmitter having an independent connection with the dynamo circuit, and this whether each telephone line is provided with one or more instruments.

He finds that the obstacle arising from the imperfect commutation at the dynamo or magneto electric machines can be obviated by the use of two or more machines, which serve to destroy the individual vibrations of the currents produced by the machines by a neutralization of such vibrations. With large and perfectly constructed machines the inventor is of opinion that this obstacle will not be met with, and a plurality of machines may not be essential; but it is met with in the machines at present generally used, and with such the use of a plurality of machines obviates the difficulty.

In applying dynamo currents to telephones in the manner already explained, the inventor states that it is convenient to use for the source of electrical energy the circuit of a system of electrical distribution for light or power, or both, which system is supplied by dynamo or magneto electric machines located at a central station, from which extends the distribution circuit, including electric lamps or motors, or both. The conductors of the system of electrical distribution extend to the buildings in which the telephones are located, and connections are made with each telephone by means of an arrangement of resistances, which reduce and modify the current of the distribution circuit to adapt it for supplying the telephones. This reduction and modification may be carried to the extent that the same telephone system may be provided with telephones worked by galvanic batteries, and the telephones supplied by dynamo currents may be worked in connection with those supplied by galvanic batteries without rendering the galvanic batteries inoperative.

The resistance used to reduce and modify the current may be adjustable, so that they can be set to divert the proper amount of energy, although this is not essential, since if such resistances are properly proportioned and connected, no adjustment will be required. Since the throwing into the circuit of a number of electric lamps or other translating devices would produce a drop in the tension of the current in the distribution system, which drop is compensated for by regulation at the central station of the distribution system, the inventor intends to provide means for maintaining the standard tension in the telephone circuit during the time that elapses before the regulation of the distribution system is performed. This means consists of a secondary cell located at each connection between the distribution and telephone circuits. So long as the tension in the distribution circuit is normal, the cell is neutralized and does not discharge; but when there is a drop in tension in the distribution circuit the cell discharges into the telephone circuit and maintains therein the standard tension until the regulation of the distribution system is performed. Since currents of any desired power may be obtained from the distribution system, the dynamo currents obtained in this way can be used effectively for operating the signals connected with the telephone lines.

This patent was applied for in Oct., 1883, and granted May 8, 1888.

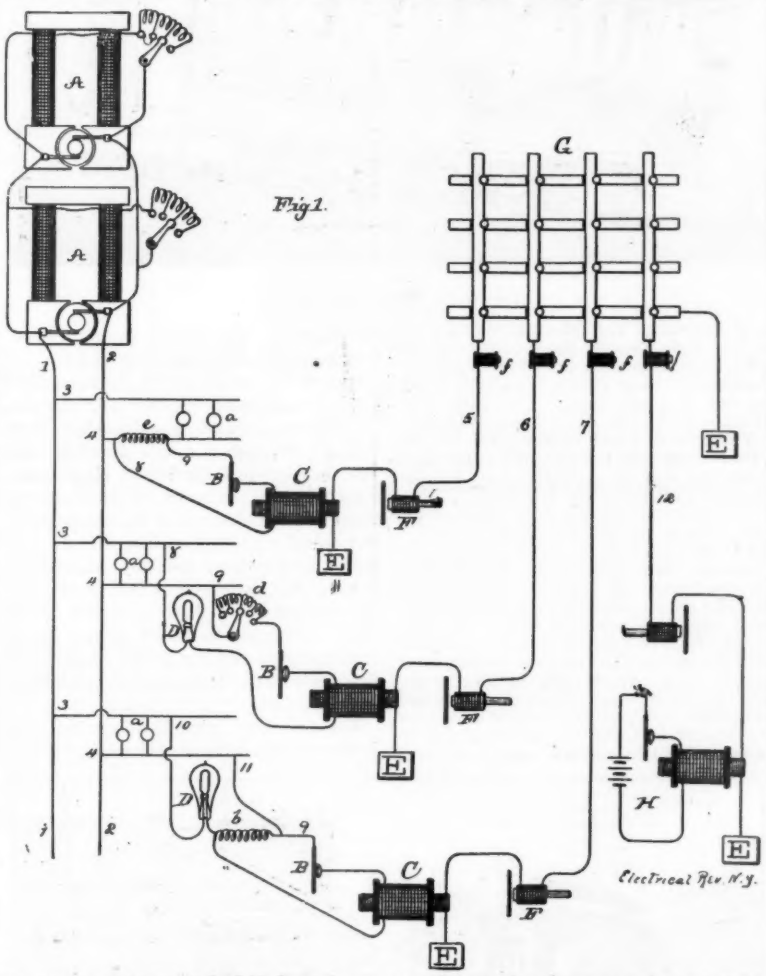


Fig 1.

DYER'S TELEPHONE SYSTEM IN WHICH THE DYNAMO IS SUBSTITUTED FOR BATTERIES

The Telephone Case.

The counsel for Drawbaugh have made an application to the Supreme Court for a rehearing in the telephone case. It would be a great public misfortune if their application were to be granted. Since the case was argued the administration has appointed Justice Lamar to the bench. When he was Secretary of the Interior, he decided that the Government should bring a suit to invalidate the Bell patent on the ground that it was fraudulently procured. This is the suit in which Garland is concerned, and which has brought so much odium upon the administration. The decision which the present applicants seek to overturn was rendered by four judges, while three dissented. Justice Gray did not sit because he had rendered the decision from which the appeal was taken, while Justice Lamar was not a member of the court when the arguments were made. As the court is now constituted, Justices Blatchford, Miller and Matthews are recorded in favor of the Bell patents, which Justices Bradley, Field and Harlan have declared in favor of the Drawbaugh claims. Justice Lamar has pronounced an opinion against the Bell patents, and Justice Gray will not sit. Of course no one knows what view Chief Justice Fuller will take, but if he follows the opinion of his predecessor, his vote will make a tie. If he should agree with Justice Bradley's opinion, the administration will have won a victory for Garland and the Pan-Electric which will simply add to its shame, and will weaken public confidence in the court of last resort. Nothing more calamitous could happen. The court has already suffered from the reopening of cases involving questions of public interest. It is an old tradition of the courts and the bar that it is better that an injustice to individuals should be occasionally done than that the courts should be brought into contempt. We do not mean to be understood to say that any injustice has been done in the telephone case. Our belief is quite the contrary. We are simply endeavoring to emphasize the importance of a refusal of the application which Drawbaugh's counsel have made. The granting it would signify to a good many people, perhaps to the majority, that the death of the Chief Justice, and two new appointments, have been taken advantage of to further the causes of private litigants and of a member of the Cabinet who has used public place for the advantage of his private purse. The President has permitted Garland to disgrace the administration; it is to be hoped that he will not go further and make the Supreme Court a sharer in the disgrace.—*N. Y. Mail and Express.*

—— After a hard fight victory seems to be with the Edison Company in getting a franchise for central station work in Brooklyn.

Telephonic News

To a Telephone Girl.

Her pleasant voice I know full well,
I ne'er have seen her face,
But I am certain it will tell
Of gentleness and grace.

I do not even know her name;
Her age I do not know,
And if I chance to speak, the same
Brief answer comes—"Hello."

'Tis sad to be a number when
One's heart is so enthralled—
To her I'm only "Sixteen-ten,"
No odds how often called.

I sometimes have a mad desire
To ask her to be mine;
I know she simply would inquire:
"Won't you keep off the line?"

There's one resort, I know, to stay
My reason on its throne;
I'll send this order in to-day:
"Take out my telephone."

—*Detroit Free Press.*

⁂ The total number of exchanges operated by the New England Telephone and Telegraph Company is 90, with a subscription list of 14,787.

⁂ Four patents relating to multiple telephone switchboards were granted M. G. Kellogg, of Chicago, last week. The applications had been filed in April, June and August last year.

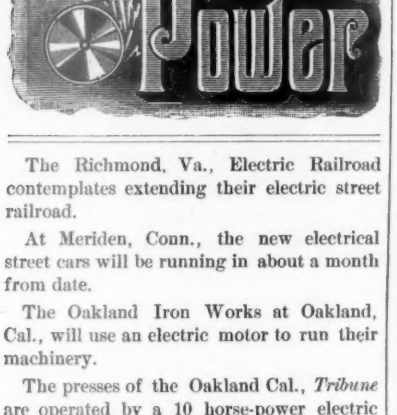
⁂ The new electrical factory in New Haven, Conn., is to be equipped at once, and will be in operation in a few months' time. The new gelatine electric battery for telephones will be the principal industry.

⁂ A Vienna engineer has just taken out a patent for a new smoke-abating process. By means of electricity he proposes to condense the solid part of the smoke as it arises from the coal, the carbon thus formed falling back into the furnace.

⁂ The old board of directors and also old officers were elected at the annual meeting of the New England Telephone Company, May 8th. They are as follows: President, Thomas Sherwin; vice-president, Henry S. Hyde; treasurer, William R. Driver; secretary, Fred. J. Boynton; general manager, W. J. Denver. Directors: Frederick Ayer, Benjamin C. Dean, William H. Forbes, John E. Hudson, Henry S. Hyde, Moses G. Parker, Stephen Salisbury, Thomas Sherwin, Howard Stockton.

⁂ The New York and New Jersey Telephone Company, last week, removed the 23 telephone and alarm boxes and two transmitters which have been used by the Police Department of Long Island City. Communication between the station house and the men on post is thus cut off. The telephones were removed because of the failure of the city to pay $240 claimed by the company to be due on the instruments. The bill was audited by the Police Commissioners, and was then sent to the aldermen for approval. But the aldermen oppose everything favored by Mayor Gleason, and as the Police Board is composed of Gleason men, Alderman Chapman opposed paying the bill, claiming that it was excessive. The matter was laid over, and the removal of the telephones followed.

⁂ At a recent meeting of the Physical Society, London, Mr. C. V. Boys described and performed some experiments on soap-bubbles, and by their aid demonstrated in a remarkable manner the phenomena of surface tension, diffusion, and the magnetic properties of gases. By blowing one bubble inside another he showed that there is no electrical force inside a closed conductor. A peculiar property of soap-bubbles is their refusal to come into contact when knocked against each other; they may receive violent shocks and still remain separate. If, however, an electrical body be brought in the vicinity, they immediately coalesce. So sensitive are they to electrical attraction, that a potential difference due to one Leclanche cell between the two bubbles causes them to unite. They may thus serve as a very delicate electroscope.



The Richmond, Va., Electric Railroad contemplates extending their electric street railroad.

At Meriden, Conn., the new electrical street cars will be running in about a month from date.

The Oakland Iron Works at Oakland, Cal., will use an electric motor to run their machinery.

The presses of the Oakland Cal., *Tribune* are operated by a 10 horse-power electric motor, furnished by the Oakland Electric Light and Motor Company

The Observatory Hill Passenger Railway, of Allegheny City, Pa.

The Observatory Hill Passenger Railway has been in continuous operation since the 21st day of February, 1888, as an electric street railway. In the construction and operation of this line almost every possible difficulty to be met in street railway work has been satisfactorily overcome.

The line is about four miles in length. For one-fourth of this distance the electric conductors are contained in a sub-surface conduit. For the remainder of the line the conductors are elevated above the roadway, being bracketed off from poles erected along the curb line on one side of the street. The conduit branches from double to single track, and at the terminus of the line (between the City Hall of Allegheny and the new Carnegie Free Library), there is a conduit cross-over switch from down to up track. At different points along the conduit section, the conduit cuts through five other street railway tracks belonging to other companies.

On the elevated conductor section the line is single track with seven turn-outs, each 200 feet in length.

Double conductors are used throughout both conduit and elevated conductor sections, neither the rails nor any part of the conduit itself being used as a part of the electric circuit.

Almost the entire line is built on grade, and there are 34 curves on the line, not including turn-outs or switches. The maximum grade is $9\frac{2}{10}$ feet in 100 feet on a length of 400 feet. There is a total rise of 295 feet in 4,900 feet, an average of about six per cent. The maximum grade of $9\frac{2}{10}$ is on a reversed curve (radii of 100 and 200 feet). The sharpest curve has a 40 foot radius on five per cent. grade.

Four full size city cars, each seating 22 passengers, are now in operation upon the line. Two more cars of the same pattern are being built, and will shortly be placed upon the line.

The motor truck under each car is—owing to the very heavy grades and curves of the line—equipped with two 15 horse-power motors. Each axle is driven separately. The motors are entirely independent of the car body, no part of the motors or mechanism being attached to, or cutting through the car floor. The car body is simply bolted on the motor truck. The motors are controlled from either end of the car, the only connection with the motor and regulating mechanism being made by means of a chain attached to each brake spindle. The ordinary brake handle turned in one direction, throws off the brakes and admits the electric current to the motors, starting the car; and turned in the opposite direction, stops the car by first shutting off the current from the motors, and then setting the brakes. Each motor has a spring support, making wear on working parts and track extremely light, while it also permits a yielding impact of the motor upon the load at starting.

Toothed gearing is used throughout, and all journals are held in rigid castings. The gearing is noiseless, efficient, reliable and durable. All journal boxes are dust-tight, and the gearing is encased in dust-tight boxing. The commutator brushes are fixed in position and need no adjustment, either for change in load or in direction of rotation. But one set of brushes is used for each motor, and there is absolutely no flashing or sparking under the heaviest load.

Each car is equipped with means for making connection with the conductor on both sections of the line, "plows" being used where the conductors are contained in the conduit, and "trollys" employed on the section where the conductors are elevated above the roadway.

The power-plant at the station consists of two one hundred horse-power boilers, natural gas being the fuel used; one two hundred horse-power "Buckeye" engine and four dynamos. This plant is sufficient to operate eight cars on the heavy grades, it being the intention of the Observatory Hill Passenger Railway Company to increase the number of motor cars on the line. The dynamos are each forty horse-power nominal.

The dynamos and motors used in the power station and on the cars are manufactured by the Thomson-Houston Electric Company, of Boston and Lynn, Mass.

The operation of the four cars so far placed upon the line has been sufficiently successful to cause the Observatory Hill Passenger Railway Company to undertake the construction of two more miles of conduit and track (specifications calling for bids upon which are now out), which will carry the line from its present terminus at the City Hall of Allegheny City over the Seventh street bridge, to a central point in Pittsburgh. The necessary permits from the municipal authorities and property owners have been already obtained, and the extension will be completed and in operation within the next few months. To operate this extension will require about ten new cars, which will be equipped with the Bentley-Knight standard single motor-truck heretofore illustrated in our columns. The six double motor cars will then be kept for work upon the hill line and passengers transferred at the City Hall. A duplicate power-plant will be erected on the river bank to supply necessary current, which will be also sufficiently powerful to operate the hill line as well, should any accident occur in the present power-station.

It is believed that this line is the most difficult street railway in operation in the world, its curves and grades rendering it beyond possibility of being run by either horses or cables.

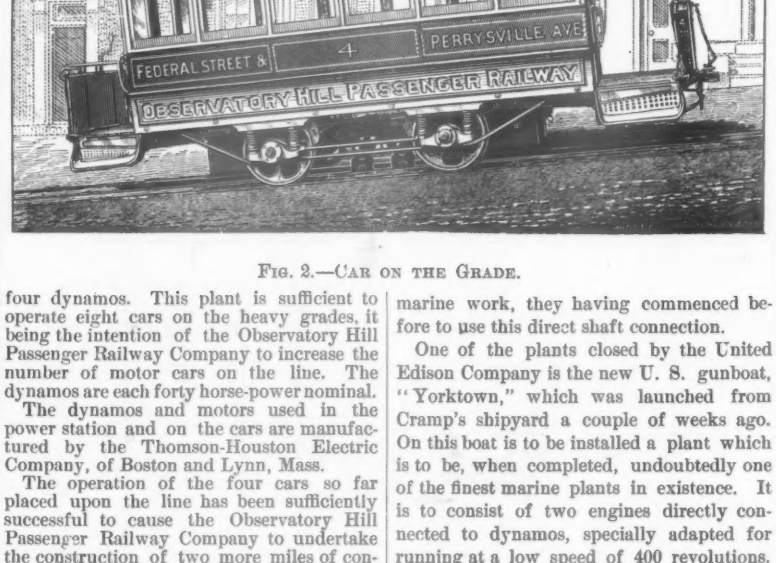


FIG. 2.—CAR ON THE GRADE.

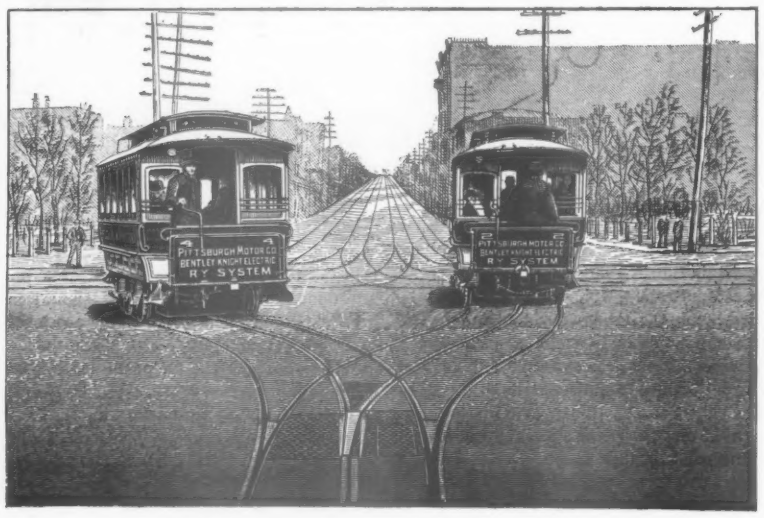


FIG. 1.—THE PITTSBURGH ELECTRIC RAILWAY.

Recent Work by the Edison Company in Electric Lighting.

Marine plants have been a source of much work on the part of the Edison United Manufacturing Company this spring, and with their new improvements, in doing away with all belting, and having Brotherhood three-cylinder engines, or other type, to connect directly on to the shaft of the dynamo, thereby saving in economy of space and obtaining plant more suitable for marine work, they are advancing most rapidly. European electric light companies have done a good deal in the last year or two in this matter of marine work, they having commenced before to use this direct shaft connection.

One of the plants closed by the United Edison Company is the new U. S. gunboat, "Yorktown," which was launched from Cramp's shipyard a couple of weeks ago. On this boat is to be installed a plant which is to be, when completed, undoubtedly one of the finest marine plants in existence. It is to consist of two engines directly connected to dynamos, specially adapted for running at a low speed of 400 revolutions. Each dynamo is to have a capacity of 800 watts. Dynamos to be compound wound and capable of running all the incandescent lights, also to be thrown on the search lights when required.

The new boat being built for the New Jersey Central Railroad at Cramp's, which is to run to Sandy Hook in the summer, and is guaranteed for 21 knots, is also being fitted out with an Edison plant of 250 lights, to have one dynamo directly connected direct to Brotherhood engine, running at 1,600 revolutions.

The two large new ferryboats, which are being built at Baltimore for the Baltimore & Ohio R. R. Co., which are said to be the finest ferryboats in the world, are also being fitted out with duplicate electric light plants. On these boats they are to depend entirely upon the electric light, and are to have no gas tanks or other means of illumination, having two engines and dynamos in each boat, of 150 lights capacity each; either engine and dynamo is capable of carrying practically the full number of lights in circuit.

The Troy boat, "Saratoga," has also just been completed and started up within the last month, being a plant of 300 lights on board, and making the boat decidedly the handsomest lit boat on the upper Hudson.

In the line of private yachts which are being installed may be mentioned the "Meteor," the "Sapphire," the "Oneida," and Slater's yacht.

Two ferryboats of the Gloucester Ferry Company, running between Gloucester City, N. J., and Philadelphia, have also just been closed, each to be furnished with a 40 light plant.

In the way of large isolated plants may be mentioned the new Drexel Building in Philadelphia—a plant of 2,200 lights is to be installed; Harrison-Frazier Co.'s sugar refinery, with new contemplated enlargements. The Edison plant which was previously there is to be largely increased, and will now have a capacity of about 2,500 lights, there being five new machines installed, and a number of new buildings wired.

In the way of insane asylums, they have just closed two for the territory of Dakota, one at Yankton and the other at Jamestown, each to have a 300 light plant.

Matters are booming up in the South also—in two hotels in Atlanta—the Kimball House and the Markham Hotel are to have plants of 400 lights each.

In the line of "cash central stations," as they are called, under the direction of the United Company, there are a large number being installed this spring. Among some of the most recent ones for which they have closed contracts may be mentioned Freehold, N. J.; Jackson, Ohio; Greenville, Miss.; Charlottesville, Va.; Laredo, Tex.; Oswego, N. Y.; Cooperstown, N. Y.; Fulton, N. Y.; Massilon, Ohio; Chetopa, Kansas.

We may mention, also, in the way of isolated plants, the Averne Hotel, at Rockaway Beach, to have a 400 light plant; Omaha & Grant Smelting and Refining Co., Omaha, Neb.; Marshall Saw Mills, Marshall, Cal.; Tivoli Opera House, San Francisco, Cal.; San Francisco Cordage Factory; Los Angeles College, Los Angeles, Cal.; Puget Lumber Company's Mill, Port Ludlow, Washington Territory.

This is a great showing, and indicates the great demand there is for the electric light.

Birmingham, Ala.—The Southern District Telegraph and Electric Company, capital stock, $40,000, has been chartered by E. W. Linn and others.

Atlanta, Ga.—The American District Messenger and Electrical Supply Company, capital stock, $10,000, has been chartered by J. M. Stephens and others.

New Haven, Conn.—The Star Manufacturing Company, with a capital stock of $5,000. The purpose of the company is to make brass goods, hardware, metal trimmings. The stockholders are Clark N. Bryant, and R. Elmer Goodrich and others.

Detroit, Mich.—The Crown Gas Manufacturing Company, with a capital stock of $15,250, filed articles of incorporation. The manufacture and sale of gas for lighting and heating purposes, and the mannfacture of machines for the making of gas from crude petroleum will be the business of the new company. The stockholders are Alfred Langdon, B. S. Harrower, W. L. Wild, C. H. Wheeler, C. A. Chidsey, and J. B. McCracken, all of Detroit.

Omaha, Neb.—The Omaha Tramway Company is organized to construct, build, purchase, lease, operate, use and maintain cable tramways and street railways with suitable turn-outs and turn-tables, with cars propelled by electricity. The authorized capital stock of the company is $5,000,000, and the organization will continue for a period of ninety-nine years. The incorporators are Samuel R. Johnson, L. B. Williams, Charles B. Rustin, Samuel D. Mercer, William V. Morse and Benjamin F. Smith.

Incandescent Lighting, Waterhouse Direct System.

The Waterhouse Electric and Manufacturing Co., Hartford, Conn., have made a number of recent installations of their direct incandescent system. We illustrate the dynamo, which is made in a very substantial manner. Much attention has been given to the proportions of this machine, and unusually satisfactory results are obtained.

The automatic regulator will admit of the turning off of any number of lights, and a constant potential will be maintained.

A plant of the Waterhouse Incandescent System has been placed for the Southern Pacific R. R., on board the palatial ferry-boat "Piedmont," running between San Francisco and Oakland. The plant was favorably noticed by the San Francisco papers, and the company have since received assurance that it continues to give entire satisfaction. All reports from the plants installed commend the system very highly.

For Lighting New York.

The New York City Gas Commission met last week and opened seven bids from electric light companies for supplying the city streets with light.

The commission rejected the former bids because the total amount of the proposals was in excess of the appropriation for street electric lights, made by the Board of Estimate and Apportionment. The commission awarded no contracts last week on the bids, which were by seven electric companies for the respective territories on which they had heretofore submitted proposals.

The bids were for so much per lamp, a night, and were as follows: Brush Electric Light Company, 441 lamps at 35 cents each per night; United States Illuminating Company, 411 lamps at 35 cents each per night; East River Electric Light Company, 493 lamps at 35 cents each per night; Mount Morris Electric Light Company, 22 lamps at 17½ cents, 79 lamps at 28 cents, 31 lamps at 28 cents, 52 lamps at 29 cents, 129 lamps at 32 cents, and 23 lamps at 40 cents each per night; North New York Lighting Company, 238 lamps at 35 cents and 153 lamps at 29 cents each per night; Harlem Electric Light Company, 36 lamps at 26 cents, 186 lamps at 28 cents, 156 lamps at 29 cents, 55 lamps at 35 cents, 19 lamps at 50 cents, and 7 lamps at 60 cents each per night; Ball Electric Light Company, 90 lamps at 27½ cents each per night.

The New York Electric Construction Company submitted a bid, but withdrew the same before it was opened. The commission will probably award the contracts within a few days.

Pumping by Electricity.

A pumping plant has been installed in an English mine, which raises the water nearly 900 feet at a single lift, the liquid being delivered at the rate of 7,200 gallons per hour. The electric current averages 66 amperes per hour, the tension of the dynamo terminals is 600 volts, on the motor, 375 volts, and about 33 horse-power is used in raising water at the rate of 120 gallons per minute through 900 feet lift. The output of the dynamo is 53 horse-power, and the efficiency is nearly 62 per cent.

—— The proprietors of the electric lights in Westhorn, Mass., are having no small amount of trouble in locating them to please individuals and confer the greatest good to the public. Some complain of the proposed light being too near, while others think they are too far away from them. Some think of leaving town for the want of one, while another has about the same feeling for the opposite reason. The majority seem agreed upon one plan, which is that they prefer to have the bright light in front of their neighbor's premises than their own. Those who are just now very much exercised over the matter will probably say and care less about it when put in operation.

Experimenting with an Electric Boat.

Mr. John Fenson, of the Fenson Elevator Works, Toronto, Ont., and a party of friends were out sailing on the Passaic river, on the 8th, on Prof. F. Reckenzaun's new electric boat, "Magnet." This boat is equipped with storage batteries of the Electrical Accumulator Company, of New York, and is the first electric boat carrying the American flag. Mr. Fenson was greatly interested in the success of the trial.

—— Mr. Joseph O. Procter is treasurer of the electric light company in Gloucester, Mass.

—— Santa Ana, Cal., was lit last week by the Thomson-Houston system of electric lighting.

—— The City of Rochester, N. Y., has appropriated $130,000 for lighting that city during the coming year.

—— The Georgia Electric Light Company, of Atlanta, Ga., will, it is stated, increase the capacity of their plant.

—— The Standard Brush Company, of New Hartford, Conn., has increased its capital stock from $5,000 to $10,000.

—— J. D. Cunningham, Orchard Hill, Ga., wants to purchase a dynamo about 35 horse power, and boiler and engine.

—— R. F. Jackson, representing the Waterhouse Electric Light Company, of Baltimore, is negotiating to put in an electric light plant in Cumberland, Md.

—— The Schuyler Electric Light Company, of Louisville, Ky., contemplate erecting a new and larger plant, with a view to furnishing incandescent lights also.

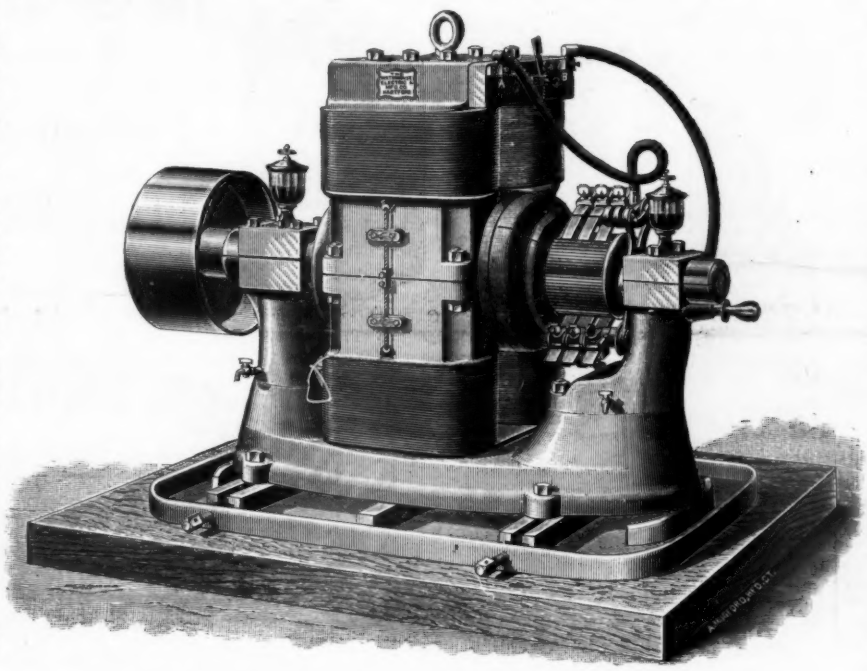
—— The Vermont Marble Company, of Proctor, Vt., is contemplating the lighting of its mills with electric lights so that they may work them at night if required.

—— The Berkeley Electric Light Company, of Berkeley, Cal., has issued a circular calling for a more extended support, either by subscription or by taking stock.

—— The Brush Electric Light and Power Company, of New Orleans, has been purchased by the Westinghouse Electric Company, of Pittsburg, for $71,000, it is stated.

—— The Gaynor Electric Supply Company, Louisville, Ky., have contracted to furnish machinery for an electric light plant to be erected at Phœnix Hill Park. The capacity will be for 300 lights.

—— An electric light plant has been purchased and will soon be placed in position for lighting of the river front—the pavilions, gardens and hotel properties at the Gloucester Point Excursion Grounds, N. J.



New Incandescent Dynamo of the Waterhouse Electric Company.

—— The electric lights at Robertsville, Conn., were run last week by the new dynamos and gave perfect satisfaction.

—— The Loomis incandescent system is being installed in the blanket mills of Messrs. Richard Hey & Sons, Monayunk, Phila., Pa.

—— The Board of Gas Trustees of Wheeling, W. Va., have recommended that an electric light plant be purchased at a cost of about $23,000.

—— The Northern New York Electric Lighting Company has in contemplation the erection of a new building on Rider avenue and 138th street.

—— The city of Frederick, Md., has decided to purchase the electric light plant from the Thomson-Houston Company. The cost will be $14,500.

—— The Frederick Seamless Hoisery Company, of Frederick, Md., have erected a dye-house, and contemplate putting in electric light machinery.

—— The Montana Coal and Coke Company, of Fairmount, W. Va., will put in electric lights at their mines; also electric motors for hauling cars.

—— W. H. Yonkin will be superintendent of the Coronado Foundry and Machine Company, San Francisco, Cal. Mining, pumping and hoisting machinery, and brass castings will be manufactured.

—— The Milwaukee Gaslight Company's contract for lighting the city will expire on July 1. It amounts to $78,000 annually. The Badger Illuminating Company will endeavor to secure the new contract for lighting the city.

—— Electric rifles may become the thing. Instead of the ordinary percussion firing device a dry chloride of silver battery and a primary coil will, so it was lately stated before the American Institute, fire the rifle 35,000 times without re-charging.

—— The electric illumination of the ferry-boat, "Piedmont," which runs between San Francisco and Oakland, Cal., is giving so much satisfaction that the company has determined to fit up the other ferry steamers in the same way. The Waterhouse system is used.

—— Electric lights are being put in to light the entire grounds around the Southern Pacific shops at Sacramento, Cal., as well as the interior of the structure, so that night shifts can be worked as successfully as by daylight. The system to be introduced is the Waterhouse.

—— The Bay State Gas Company may console itself with the old adage that half a loaf is better than no bread. The bill to increase the capital stock from $500,000 to $5,000,000 was amended in the Senate last week, so as to fix the amount at $2,500,000, after which the bill was ordered to a third hearing by vote of 28 to 5.

ELECTRIC LIGHT NEWS

—— The steam yacht "Talisman," owned by W. A. Slater, has been equipped by the Electrical Accumulator Lighting Company, Conn., with accumulators for the purpose of lighting. The yacht "Saginaw" has also been equipped in this way by the Isolated Electrical Accumulator Company, of New York.

—— The people of the east side, Toledo, Ohio, are now enjoying the luxury of that best light in the world—the electric light. In this respect they are ahead of their neighbors on the west side, for not only are the places of business illuminated by electricity, but also the streets, while the people of Toledo still consume immense quantities of gas in its city lighting.

—— Over $100 worth of electric light wire belonging to the Brush Electric Light Company, St. Louis, Mo., has been stripped off poles in the vicinity of Main and Plum streets. The thieves, who are as yet unknown, were well posted and took what wires were not used in the circuit and some that were not in use at all. Part of the wire has been recovered, but the thieves are wanted.

—— It is understood that the Board of Trustees of Oneida, N. Y., has made a contract with J. W. Warner to light the streets of the village of Oneida for a year from June 1st, at about 24 cents per light each night, the lamps to burn from sun down to midnight, 25 nights in each month, and the number of lights to be fixed by the Board of Trustees. Mr. Warner has purchased the plant of the American Electric Light Company; consideration, $6,000.

—— Pawtucket, R. I., is looking forward to the time when it will own the electric lights that illuminate the streets, and with a view to that purpose two new lights of the Waterhouse system, and run by the Waterhouse dynamo, were put in operation. These were put in under the direction of the City Council Committee on Electric Lights and the superintendent of street lights as a test, in comparison with the lights of the Thomson-Houston system now in use.

—— In the mention of Mr. A. Reckenzaun, the London *Electrical Review* says: "The friends of this distinguished engineer will be pleased to learn that he has just returned in excellent health from America, where he went in May last to fulfil a four months' professional engagement. That the time has been extended to nearly a year shows how much his technical knowledge has been appreciated by our trans-Atlantic cousins. He speaks very highly of the people and the country, and American electricians will find in him a warm advocate of their energy and enterprise."

—— Some months ago the City of New Orleans, with the view of abolishing the poles and wire on the principal thoroughfares, granted to Morris J. Hart and others the right to erect towers for the purpose of carrying all telephone, telegraph, and electric light wires. At intervals of two or three squares towers were erected over the street crossings, the supports resting on each street corner. The New Orleans Gas Light Company opposed the erection of the towers, claiming that they interfered with the lamp posts on the street corners, and sought to enjoin their construction. The Supreme Court, last week, affirmed the judgment of the lower court authorizing the Tower Company to remove the gas-light posts which are not now used for lighting the city. The court says the City of New Orleans, in the exercise of its police power, has the right of removing such obstruction for public convenience and the comfort of the community without encroaching on the like power vested in Congress by the Federal Constitution.

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MAY 8, 1888.

382,299 Electric railway signal; Burton H. Gedge, Covington, Ky.

382,332 382,333 Switch for electric circuits; Clarence C. Stirling, Hartford, Conn., assignor to Charles E. Dustin, same place.

382,335 Alternating current dynamo electric machine. 382,336 Alternating current regulator; Elihu Thomson, Lynn, Mass.

382,358 Plate for storage batteries; Charles D. B. Gibson, New York, N. Y.

382,414 Burnishing attachment for phonographs. 382,415 System of electrical distribution.

382,416 Feed and return mechanism for phonographs.

382,417 Process of making phonogram blanks. 382,418 Phonogram blank. 382,419 Process of duplicating phonograms; Thomas A. Edison, Llewellyn Park, N. J.

382,420 Secondary battery; Ludwig Epstein, Martinikenfelde, near Berlin, Germany.

382,421 Electric arc lamp; Richard E. Fenner, Chicago, Ill., assignor to Charles K. Giles, same place.

382,439 Electric burglar alarm; Henry C. Roome, Jersey City, N. J.

382,444 Electric burglar alarm; George F. Daft, Boston, Mass.

381,461 Telephone system; Richard N. Dyer, New York, N. Y.

382,462 Phonogram blank; Thomas A. Edison, Llewellyn Park, N. J.

382,474 382,475 382,476 382,477 Multiple switch board; Milo G. Kellogg, Hyde Park, Ill.

382,483 Electric motor for railway cars; William M. McDougall, East Orange, N .J.

382,515 Electric railway signal; Constant F. de Redon, New York, N. Y.

382,518 Telephone exchange; Horace H. Eldred, Boston, Mass., assignor to the Western Electric Company, Chicago, Ill.

382,560 Electric lamp filament; Carl Seel, Berlin, Germany.

382,589 Electric motor; George F. Card, Covington, Ky., assignor to the George F. Card Manufacturing Company, same place.

382,593 Electric stop motion for knitting machines; Charles Draper, Springfield, Mass.

382,599 Automatic switch for secondary batteries; Camille A. Faure, New York, N. Y., assignor to the Electrical Accumulator Company, of New York.

382,625 Automatic electrical switch; Frederick Stitzel, Louisville, Ky., assignor to the American Semaphore Company, same place.

EMPLOYMENT.—An open competitive examination of applicants for appointment under the Board of Electrical Control as Electrical Expert, Inspectors of Electrical Conduits and Inspectors of Underground Construction, will be held at Room 21, Cooper Union, New York City, Tuesday, May 22d, commencing at 10 o'clock, A. M. Blank applications and other information may be had on application to the Secretary of the Civil Service Commission, Albany, N. Y. **JOHN B. RILEY,**
Albany, N. Y., May 6th, 1888. Chief Examiner.

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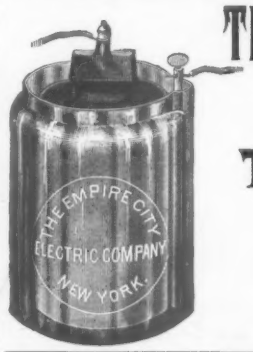

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